Access DB# 80516

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Andrew Ottmans Examiner #: 76211 Date: 11/19/02
Art Unit: 1712 Phone Number 30 8-2594 Serial Number: 09/922,915
Mail Box and Bldg/Room Location: CP3-7C07 Results Format Preferred (circle): PAPER, DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: High Purity Tantalum

Inventors (please provide full names):

Earliest Priority Filing Date: 11/25/98

***For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.**

I need a search on high purity tantalum according to the indicated claims. Other claim recite purity @ (≥ 99.5%) and grain size 150 microns or less w/ texture. But the focus of the search should be the (111) texture of the tantalum. It is also called crystal orientation or <111> <uvw> or {111} <uvw>. Also, the texture's use in tantalum sputtering targets. (See attached claims 120, 150, 158 & 171)

Thanks,
Andrew

for the 17 = 168.89 - 0.8

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STAFF USE ONLY

Searcher: John Calve
Searcher Phone #:
Searcher Location:
Date Searcher Picked Up: 11/25/02
Date Completed: 11/25/02
Searcher Prep & Review Time: ~~150~~ 60 min.
Clerical Prep Time:
Online Time: ~~Final~~ 90 min

Type of Search

NA Sequence (#) 47
AA Sequence (#) 15
Structure (#) 1
Bibliographic
Litigation
Fulltext
Patent Family
Other

Vendors and cost where applicable

STN ✓ #
Dialog ✓ #10.31 Index & Search
Questel/Orbit
Dr.Link
Lexis/Nexis
Sequence Systems
WWW/Internet
Other (specify)

PTO-1590 (1-2000)

Andrew,

I performed an "index search" of 295 files to determine which files had the most number of hits for Ta <111>. My search included Chem abstracts, Inspec, Compendex and Metadex. for your info - Metadex doesn't support any highlighting.

I searched tantalum and the salt used dipotassium heptafluoride. Then I added in sputtering or grain or purity etc.

Unfortunately, I pulled some records with a Ta alloy "111" and some re cords with Si (111). In the Chem. Abstracts record - it doesn't contain anything about the crystal orientation.

If you have any questions please feel free to call me at your convenience. Thanks.

John

308-4139

=> file hcaplus

FILE 'HCAPLUS' ENTERED AT 14:52:38 ON 25 NOV 2002
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

=> d his nofile

(FILE 'HOME' ENTERED AT 14:02:59 ON 25 NOV 2002)

FILE 'REGISTRY' ENTERED AT 14:03:04 ON 25 NOV 2002
E TANTALUM/CN
L1 1 SEA ABB=ON PLU=ON TANTALUM/CN
D SCAN
E K2TAF7/CN
E POTASSIUM FLUOROTANTALATE/CN
L2 1 SEA ABB=ON PLU=ON "POTASSIUM FLUOROTANTALATE"/CN
D SCAN

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     FILE 'HCAPLUS' ENTERED AT 14:05:16 ON 25 NOV 2002
L3         40232 SEA ABB=ON  PLU=ON  L1
L4           229 SEA ABB=ON  PLU=ON  L2
L5        111730 SEA ABB=ON  PLU=ON  TANTALUM# OR TA
L6        114928 SEA ABB=ON  PLU=ON  L1 OR L5
L7            18 SEA ABB=ON  PLU=ON  (POTASSIUM# OR DIPOTASSIUM# OR DI(W)POTASSI
                 UM# OR K OR K2)(2A)(FLUORO? OR HEPTAFLUORO# OR HEPTA(W)FLUORO#
                 OR F)(A)(TA OR TANTAL?)
L8           236 SEA ABB=ON  PLU=ON  L2 OR L7
L9           235 SEA ABB=ON  PLU=ON  TANTAL?(2A)(SALT OR DISALT? OR DI(W)SALT?)

L10          460 SEA ABB=ON  PLU=ON  L8 OR L9
L11       174811 SEA ABB=ON  PLU=ON  111 OR 1(W)1(W)1
L12       222840 S ORIENTA? OR MILLER####
L13       767101 SEA ABB=ON  PLU=ON  SPUTTER? OR DEPOSIT?
L14       301161 SEA ABB=ON  PLU=ON  AXI? OR AXES?
L15       345570 SEA ABB=ON  PLU=ON  GRAIN?
L16          259 SEA ABB=ON  PLU=ON  L6(3A)L11
L17           22 SEA ABB=ON  PLU=ON  L16 AND L15
                 D L17 1 ALL
L18            5 SEA ABB=ON  PLU=ON  L17 AND L13
L19            1 SEA ABB=ON  PLU=ON  L17 AND L14
                 D SCAN
                 D L19 ALL
L20       174811 SEA ABB=ON  PLU=ON  {111} OR {1(W)1(W)1}
L21       115294 SEA ABB=ON  PLU=ON  "<111>" OR "<1(W)1(W)1>"
L22       174811 SEA ABB=ON  PLU=ON  L20 OR L21
L23           22 SEA ABB=ON  PLU=ON  L17 AND L22
L24            5 SEA ABB=ON  PLU=ON  L18 AND L22
L25            1 SEA ABB=ON  PLU=ON  L19 AND L22
                 D SCAN L24
L26           30 SEA ABB=ON  PLU=ON  L8 AND L13
L27           30 SEA ABB=ON  PLU=ON  L26 AND L13
L28      1445834 SEA ABB=ON  PLU=ON  PUR?
L29            7 SEA ABB=ON  PLU=ON  L27 AND L28
L30            6 SEA ABB=ON  PLU=ON  L23 AND L28
L31           13 SEA ABB=ON  PLU=ON  L29 OR L25 OR L24
L32            2 SEA ABB=ON  PLU=ON  L26 AND L15
L33           14 SEA ABB=ON  PLU=ON  L31 OR L32
L34           52 SEA ABB=ON  PLU=ON  L23 OR L26
L35           38 SEA ABB=ON  PLU=ON  L34 NOT L33

     FILE 'INSPEC' ENTERED AT 14:21:40 ON 25 NOV 2002
L36            0 SEA ABB=ON  PLU=ON  K2TAF6
L37        21417 SEA ABB=ON  PLU=ON  TA/ET
L38        15338 SEA ABB=ON  PLU=ON  TANTALUM##
L39        25491 SEA ABB=ON  PLU=ON  L37 OR L38
L40          726 SEA ABB=ON  PLU=ON  L39 AND (L11 OR L20 OR L21)
L41          270 SEA ABB=ON  PLU=ON  L40 AND L13
L42           79 SEA ABB=ON  PLU=ON  L41 AND L15
L43        57642 SEA ABB=ON  PLU=ON  (L11 OR L20 OR L21)
L44          726 SEA ABB=ON  PLU=ON  L39(3A)L43
L45        24496 SEA ABB=ON  PLU=ON  L38 OR TA
L46          114 SEA ABB=ON  PLU=ON  L45(3A)L43
L47           38 SEA ABB=ON  PLU=ON  L46 AND L13
L48            6 SEA ABB=ON  PLU=ON  L47 AND L15
                 D SCAN
                 D SCAN L47
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     FILE 'INSPEC' ENTERED AT 14:30:08 ON 25 NOV 2002
L49          29 SEA ABB=ON  PLU=ON  L45(A)L43
L50           2 SEA ABB=ON  PLU=ON  L49 AND L13
L51           5 SEA ABB=ON  PLU=ON  L49 AND L15
L52          13 SEA ABB=ON  PLU=ON  L48 OR L50 OR L51
L53           7 SEA ABB=ON  PLU=ON  TANTAL?(3A)SALT###
                D SCAN
L54           0 SEA ABB=ON  PLU=ON  HEPTA#(2A)(FLUOR?)(2A)(TANTAL? OR TA)
L55          51 SEA ABB=ON  PLU=ON  (HEPTA#(2A)FLUOR? OR FLUOR?)(2A)(TANTAL?
                OR TA)
L56          10 SEA ABB=ON  PLU=ON  L55 AND (POTASSIUM? OR K)
L57           2 SEA ABB=ON  PLU=ON  L56 AND L13
                D SCAN
L58          15 SEA ABB=ON  PLU=ON  L52 OR L57
L59           0 SEA ABB=ON  PLU=ON  K2TAF6/ET
L60          17 SEA ABB=ON  PLU=ON  (KTAF6 OR K2TAF## OR K2(A)TA(2A)F#)
L61           4 SEA ABB=ON  PLU=ON  L60 AND L13
L62           4 SEA ABB=ON  PLU=ON  L60 AND L28
L63          17 SEA ABB=ON  PLU=ON  L60 OR L61 OR L62

     FILE 'METADEX' ENTERED AT 14:39:11 ON 25 NOV 2002
                E TANTALUM+ALL/ET
                E TANTALUM/ET
                E KTAF6/ET OR K2TAF6/ET
                E KTAF6/ET
                E K2TAF6/ET
L64          41 SEA ABB=ON  PLU=ON  (K2TAF2/ET OR K2TAF2-KBF4-NA2O/ET OR
                K2TAF7/ET OR "K2TAF7,KCL"/ET OR K2TAF7-KCL/ET OR K2TAF7-LIF-NAF
                /ET OR K2TAF7-NACL/ET OR K2TAF7-NACL-KCL/ET)
L65          19 SEA ABB=ON  PLU=ON  L64 AND L13
L66           0 SEA ABB=ON  PLU=ON  L65 AND L15
L67           3 SEA ABB=ON  PLU=ON  L65 AND L28
                D SCAN L65
                D TRIAL L65 1-19
L68       13677 SEA ABB=ON  PLU=ON  (TA OR TANTALUM#)
L69        1763 SEA ABB=ON  PLU=ON  L68 AND L13
L70         178 SEA ABB=ON  PLU=ON  L69 AND L15
L71          19 SEA ABB=ON  PLU=ON  L70 AND L28
                D SCAN
                D TRIAL L71
                D TRIAL 2-19 L71
L72          59 SEA ABB=ON  PLU=ON  L68(3A)(L11 OR L20 OR L21)
L73          13 SEA ABB=ON  PLU=ON  L72 AND L13
L74           3 SEA ABB=ON  PLU=ON  L73 AND L15
L75           0 SEA ABB=ON  PLU=ON  L73 AND L28
L76           7 SEA ABB=ON  PLU=ON  L72 AND L28
L77          20 SEA ABB=ON  PLU=ON  L73 OR L74 OR L76
                D TRIAL L77
                D TRIAL 2-10 L77

     FILE 'COMPENDEX' ENTERED AT 14:46:39 ON 25 NOV 2002
L78       14604 SEA ABB=ON  PLU=ON  TA OR TANTALUM#
L79          49 SEA ABB=ON  PLU=ON  L78(3A)(L20 OR L21 OR L11)
L80          13 SEA ABB=ON  PLU=ON  L79 AND L13
L81           1 SEA ABB=ON  PLU=ON  L80 AND L15
L82           0 SEA ABB=ON  PLU=ON  L80 AND L28
L83           8 SEA ABB=ON  PLU=ON  L79 AND L28
L84          21 SEA ABB=ON  PLU=ON  L80 OR L81 OR L83
                E (K2TAF6 OR KTAF#)/ET
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                E K2TAF6/ET
L85          27 SEA ABB=ON  PLU=ON  K2TAF7/ET
L86         115 SEA ABB=ON  PLU=ON  (POTASSIUM# OR K OR K2 OR DIPOTASSIUM#)(2A)
                (TANAL? OR TA)
L87           2 SEA ABB=ON  PLU=ON  L86 AND (HEPTAFLUOR? OR HEPTA(W)FLUOR? OR
                FLUOR?)
L88           9 SEA ABB=ON  PLU=ON  L86 AND L15
L89          20 SEA ABB=ON  PLU=ON  L86 AND L13
L90           1 SEA ABB=ON  PLU=ON  L89 AND L28
L91          33 SEA ABB=ON  PLU=ON  L84 OR L87 OR L88 OR L90

     FILE 'HCAPLUS' ENTERED AT 14:52:38 ON 25 NOV 2002

=> d L33 1-14 cbib abs hitind hitrn

L33  ANSWER 1 OF 14  HCAPLUS  COPYRIGHT 2002 ACS
2000:688735   Document No. 133:299625  Nucleation of recrystallized
     grains in multiple slipped structure without deformation band in
     aluminum single crystal.  Kashihara, K.; Tagami, M.; Okada, T.; Inoko, F.
     (Department of Mechanical Engineering, Wakayama National College of
     Technology, Wakayama, 644-0023, Japan).  Materials Science & Engineering,
     A: Structural Materials: Properties, Microstructure and Processing,
     A291(1-2), 207-217 (English) 2000.  CODEN: MSAPE3.  ISSN: 0921-5093.
     Publisher: Elsevier Science S.A..
AB   The characteristics of multiple slipped structure and the nucleation of
     recrystd. grains (RGs) were investigated using pure aluminum
     single crystals with an initial tensile axis (TA)
     orientation of <111> deformed in tension.  By a scanning
     electron microscope (SEM), short and wavy slip traces without deformation
     bands (DBs) were obsd., in which the max. misorientation was only approx.
     5.degree..  By a transmission electron microscope (TEM), a layered
     dislocation microstructure consisted of cells with dense dislocation walls
     (DDWs) was developed.  Groups of the cells were mutually rotated, by
     approx. 4.degree., about an axis normal to the TA as if they
     maintained tensile strain and compressive strain by turns.  After
     annealing, orientations of RGs were mainly rotated at angles of over
     26.degree. about each <111> axis normal to four kinds
     of {111} slip planes in each adjacent deformed matrix (DM).  It
     is renewed in more detail that the nucleation of the RGs with the <
     111> rotation relation to each adjacent DM could be explained by
     the <111> rotation recrystn. (nucleation) model.  The <
     111> rotation relationships between the deformation textures and
     the corresponding annealing textures in FCC metals are selected in both
     stages of the nucleation of RGs as well as their growth.
CC   56-8 (Nonferrous Metals and Alloys)
ST   nucleation recrystd grain aluminum single crystal
IT   Crystal nucleation
     Recrystallization
        (nucleation of recrystd. grains in multiple slipped structure
        without deformation band in aluminum single crystal)
IT   7429-90-5, Aluminum, processes
     RL: PEP (Physical, engineering or chemical process); PRP (Properties);
     PROC (Process)
        (nucleation of recrystd. grains in multiple slipped structure
        without deformation band in aluminum single crystal)

L33  ANSWER 2 OF 14  HCAPLUS  COPYRIGHT 2002 ACS
2000:368652   Document No. 132:351294  High-purity tantalum suitable
     for powder alloying and manufacture of cast recrystallized strip for
     sputtering targets.  Michaluk, Christopher A.; Maguire, James D.,
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Jr.; Kawchak, Mark N.; Huber, Louis E., Jr. (Cabot Corporation, USA). PCT Int. Appl. WO 2000031310 A1 20000602, 54 pp. DESIGNATED STATES: W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US27832 19991124. PRIORITY: US 1998-199569 19981125.

AB The Ta powder is manufd. by redn. of suitable salt (esp. K2TaF7) with Na, Mg, or a similar metal, and is **purified** by electron-beam melting in vacuum chambers lined with refractory metals for the **purity** .gtoreq.99.995%. The high-**purity** Ta is suitable for manuf. of recrystd. **sputtering** targets having the av. **grain** size .ltoreq.50 .mu.m. The Ta is also suitable for manuf. of elec. capacitors, wires, or resistive film layers for integrated circuits.

IC ICM C22B034-24
ICS C23C014-34

CC 56-4 (Nonferrous Metals and Alloys)
Section cross-reference(s): 76

ST tantalum powder manuf **purifn** vacuum melting; **sputtering** target tantalum **purity** recrystn; elec circuit capacitor manuf tantalum **purity**

IT Refractory metals
RL: DEV (Device component use); USES (Uses)
(lining, app. with; manuf. of high-**purity** tantalum powder by salt redn. in high-temp. metal-lined app.)

IT Electron beams
(melting with; high-**purity** tantalum powder for melting and manuf. of recrystd. **sputtering** targets)

IT Recrystallization
(of tantalum; high-**purity** tantalum powder for alloying and manuf. of recrystd. **sputtering** targets)

IT Capacitors
(tantalum for; high-**purity** tantalum for manuf. of elec. capacitors and recrystd. **sputtering** targets)

IT **Sputtering**
(tantalum; high-**purity** tantalum powder for alloying and manuf. of recrystd. **sputtering** targets)

IT 7440-25-7P, Tantalum, preparation
RL: PUR (Purification or recovery); PREP (Preparation)
(high-**purity** tantalum powder for alloying and manuf. of recrystd. **sputtering** targets)

IT 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7440-02-0, Nickel, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses 7440-32-6, Titanium, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-58-6, Hafnium, uses 7440-62-2, Vanadium, uses 7440-67-7, Zirconium, uses
RL: DEV (Device component use); USES (Uses)
(lining, app. with; manuf. of high-**purity** tantalum powder by salt redn. in high-temp. metal-lined app.)

IT **16924-00-8**, Potassium fluorotantalate (K2TaF7)
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(redn. of; high-**purity** tantalum powder for alloying and manuf. of recrystd. **sputtering** targets)

IT 7440-23-5, Sodium, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(redn. with, for tantalum; high-**purity** tantalum powder for alloying and manuf. of recrystd. **sputtering** targets)

IT **16924-00-8**, Potassium fluorotantalate (K2TaF7)
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(redn. of; high-**purity** tantalum powder for alloying and manuf. of recrystd. **sputtering** targets)

L33 ANSWER 3 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1999:764245 Document No. 132:14077 **Purification** of tantalum powder for manufacture of **sputtering** targets by ingot casting and machining. Rosenberg, Harry; Ozturk, Bahri; Wang, Guangxin; Larue, Wesley (Alta Group, Inc., USA). PCT Int. Appl. WO 9961670 A1 19991202, 23 pp. DESIGNATED STATES: W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US11691 19990526. PRIORITY: US 1998-86868 19980527; US 1999-316777 19990521.

AB The Ta powder is manufd. from **purified** K2TaF7 feed by redn. with Na, and the resulting Ta sponge is **purified** by reaction with I2 vapor in a container app. lined with Mo, W, or the Mo-W alloy. The com. K2TaF7 is preferably **purified** to remove the Nb assocd. with Ta in ores. The process can be modified for recovery of the Ta from scrap. The high-**purity** Ta sponge or powder is melted with electron beam and cast to obtain the Ta ingot suitable for machining of the **sputtering** targets. The high-**purity** Ta can be prepd. with <20 ppm of Nb, Mo, and W, and is suitable for **sputtered** films in the manuf. of semiconductor circuits or elec.-film capacitors.

IC ICM C22B034-24
ICS C23C014-34

CC 54-3 (Extractive Metallurgy)
Section cross-reference(s): 76

ST tantalum sponge powder **purifn** iodine vapor; electron beam melted tantalum target **sputtering**; elec circuit tantalum **sputtering** target manuf

IT Capacitors
(film, **sputtered** tantalum for; **purifn**. of tantalum powder for manuf. of **sputtering** targets by casting and machining)

IT Electron beams
(melting with, of tantalum; **purifn**. of tantalum powder for manuf. of **sputtering** targets by casting and machining)

IT Integrated circuits
Sputtering
(tantalum for; **purifn**. of tantalum powder for manuf. of **sputtering** targets by casting and machining)

IT 7440-25-7P, Tantalum, preparation
RL: PUR (Purification or recovery); PREP (Preparation)
(for **sputtering**; **purifn**. of tantalum powder for manuf. of **sputtering** targets by casting and machining)

IT 7439-98-7, Molybdenum, processes 7440-03-1, Niobium, processes 7440-33-7, Tungsten, processes
RL: REM (Removal or disposal); PROC (Process)
(in tantalum **purifn**.; **purifn**. of tantalum powder for manuf. of **sputtering** targets by casting and machining)

IT **16924-00-8P**, Potassium fluorotantalate (K2TaF7)
RL: PUR (Purification or recovery); PREP (Preparation)
(redn. of, for tantalum powder; **purifn**. of tantalum powder for manuf. of **sputtering** targets by casting and machining)

IT 7440-23-5, Sodium, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(redn. with; **purifn.** of tantalum powder for manuf. of **sputtering** targets by casting and machining)
IT 7553-56-2, Iodine, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(vapor, tantalum **purifn.** with; **purifn.** of tantalum powder for manuf. of **sputtering** targets by casting and machining)
IT **16924-00-8P**, Potassium fluorotantalate (K2TaF7)
RL: PUR (Purification or recovery); PREP (Preparation)
(redn. of, for tantalum powder; **purifn.** of tantalum powder for manuf. of **sputtering** targets by casting and machining)

L33 ANSWER 4 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1998:727438 Document No. 130:30589 Oxygen in electrochemistry of Nb and Ta. Two aspects of the problem: elimination of harmful impurity and electrodeposition of useful oxygen-containing compounds. Grinevitch, V. V.; Arakcheeva, A. V.; Polyakov, E. G.; Polyakova, L. P.; Kuznetsov, S. A. (Baykov Institute of Metallurgy, Russian, Academy of Sciences, Moscow, 117911, Russia). Proceedings - Electrochemical Society, 98-11(Molten Salts XI), 84-97 (English) 1998. CODEN: PESODO. ISSN: 0161-6374. Publisher: Electrochemical Society.
AB The electrodeposition of Nb and Nb compds. from halide and oxohalide melts was characterized and compared with that of Ta and Ta compds. By changing some conditions of electrolysis it became possible to **purposefully** control the chem. and phase compns. of the cathode products over a wide range. In particular, it is possible to electrolytically synthesize a series of previously unknown compds. Among them are those whose structure are related to the same type as cuprates - the widely known high-temp. superconductors. The most important parameter detg. the compn. of cathode **deposits** during electrolysis in halide-oxohalide melts is the O/Nb or O/Ta molar ratio in them. However, its effect shows up differently in melts with different cationic and anionic compns. and at different temps.
CC 72-8 (Electrochemistry)
Section cross-reference(s): 56
IT 7782-44-7, Oxygen, properties
RL: PRP (Properties)
(content in cathode **deposits** in KCl-NaCl-K2NbF7 melt)
IT **16924-00-8**, Potassium heptafluorotantalate 17523-77-2
99772-93-7, Dipotassium pentafluorooxotantalate(2-)
RL: FMU (Formation, unclassified); PRP (Properties); RCT (Reactant); FORM (Formation, nonpreparative); RACT (Reactant or reagent)
(electrodeposition of oxygen-contg. compds. of tantalum from molten salt contg.)
IT **16924-00-8**, Potassium heptafluorotantalate
RL: FMU (Formation, unclassified); PRP (Properties); RCT (Reactant); FORM (Formation, nonpreparative); RACT (Reactant or reagent)
(electrodeposition of oxygen-contg. compds. of tantalum from molten salt contg.)

L33 ANSWER 5 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1997:756196 Document No. 128:51491 Evidence of heteroepitaxial growth of copper on beta-tantalum. Kwon, Kee-Won; Ryu, Changsup; Sinclair, Robert; Wong, S. Simon (Department of Materials Science and Engineering, Stanford University, Stanford, CA, 94305, USA). Applied Physics Letters, 71(21), 3069-3071 (English) 1997. CODEN: APPLAB. ISSN: 0003-6951. Publisher: American Institute of Physics.
AB Crystallog. orientations between thin-**sputtered** Cu film and .beta.-Ta adhesion layer have been studied using high resoln. electron

microscopy and electron diffraction. Tetragonal .beta.-Ta **deposited** on SiO2 has a strong texture with its closest packed plane (002) parallel to the film surface. On (002) .beta.-**Ta**, the growth of (**111**)Cu is preferred. Even though more than 100 .beta.-Ta **grains** are found under a single Cu **grain**, the Ta **grains** under a Cu **grain** have long range in-plane texture with [330] direction aligned parallel to the [220] direction of Cu. This orientational coincidence is explained by the heteroepitaxial relationship between the hcp. at. array in Cu(**111**) plane and the pseudohexagonal configuration of .beta.-Ta atoms in (002) plane with a misfit strain of 7.6.

CC 56-8 (Nonferrous Metals and Alloys)
Section cross-reference(s): 75

L33 ANSWER 6 OF 14 HCAPLUS COPYRIGHT 2002 ACS

1997:431753 Document No. 127:97802 Studies on tantalum extraction. Suri, A. K.; Mukherjee, T. K.; Gupta, C. K. (Materials Group, Bhabha Atomic Research Centre, Bombay, 400 085, India). Tantalum, Proceedings of a Symposium held at the 125th TMS Annual Meeting and Exhibition, Anaheim, Calif., Feb. 5-8, 1996, 39-46. Editor(s): Chen, Edward S. Minerals, Metals & Materials Society: Warrendale, Pa. (English) 1996. CODEN: 64PJA2.

AB A review with 33 refs. A brief account of research and development program on tantalum extn. at Bhabha At. Research Center is given. In India, sources of tantalum are rather limited. It is known to occur as columbite-tantalite in assocn. with mica pegmatites, with **deposits** of tin as columbite-tantalite and also in the crystal lattice of cassiterite. Besides these, some quantity of niobium and tantalum is generated as sludge during the processing of cemented carbide tools. Processes have been developed to treat all these sources to prep. **pure** K2TaF7 and Ta2O5. Extensive studies have been carried out and no. of processes have been developed to prep. **pure** tantalum using each of these compds. While fused salt electrowinning and sodium redn. techniques have been developed for the redn. of K2TaF7, redn. of oxide has been accomplished with calcium, aluminum, carbon and carbon-nitrogen. Final **purifn.** of metal, if necessary, was carried out generally by electron beam melt refining. An alternate **purifn.** route based on fused salt electrorefining has also been developed.

CC 54-0 (Extractive Metallurgy)

IT **16924-00-8**, Potassium tantalum fluoride k2taf7
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(molten; prepn of Ta by molten fluoride-oxide salt electrolysis and electrom beam refining)

IT **16924-00-8**, Potassium tantalum fluoride k2taf7
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(molten; prepn of Ta by molten fluoride-oxide salt electrolysis and electrom beam refining)

L33 ANSWER 7 OF 14 HCAPLUS COPYRIGHT 2002 ACS

1996:745688 Document No. 126:24107 Electrodeposition of Ta films from molten salt by pulse potential and their corrosion resistance. Hara, Motoi; Isobe, Mitsunori; Sato, Yoshiyuki; Nakagawa, Tokiko (Min. Coll., Akita Univ., Akita, 010, Japan). Hyomen Gijutsu, 47(11), 963-968 (Japanese) 1996. CODEN: HYGIEX. ISSN: 0915-1869. Publisher: Hyomen Gijutsu Kyokai.

AB Ta films were electrodeposited on the Ni substrate by pulse potential in a NaCl-KCl molten salt contg. K2TaF7 at 1073 K. The film morphol. was investigated using SEM and film constituents using EPMA and x-ray diffraction anal. Attention was focused particularly on the influence of the applied pulse potential on film morphol. Films consisted of an inner

layer of metallic Ta and Ta-Ni intermetallic compds. and an outer layer of metallic Ta and Ta oxide, and did not depend on the applied pulse potential. For film formed by polarization at pulse potentials of -1.1 and -0.6 V, which generated a large cathodic and small anodic current, a thick, homogeneous inner layer was obsd. Anodic polarization curves measured in a hot HNO3 soln. showed that samples with **deposition** films became passive in the soln. For the sample with film formed at pulse potentials of -1.1 and -0.6 V, spontaneous passivation behavior, in particular, was obsd., the same as for **pure** Ta.

CC 72-6 (Electrochemistry)
Section cross-reference(s): 56

IT **16924-00-8**, Potassium tantalum fluoride (K2TaF7)
RL: MOA (Modifier or additive use); NUU (Other use, unclassified); USES (Uses)
(electrodeposition of tantalum films from molten salt by pulse potential and their corrosion resistance)

IT **16924-00-8**, Potassium tantalum fluoride (K2TaF7)
RL: MOA (Modifier or additive use); NUU (Other use, unclassified); USES (Uses)
(electrodeposition of tantalum films from molten salt by pulse potential and their corrosion resistance)

L33 ANSWER 8 OF 14 HCAPLUS COPYRIGHT 2002 ACS

1995:137980 Document No. 122:94767 Texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr, Ta and SiO2 buffer layers. Galtier, P.; Jerome, R.; Valet, T. (Lab. Cent. Recherches, THOMSON-CSF, Orsay, 91404, Fr.). Materials Research Society Symposium Proceedings, 343(Polycrystalline Thin Films: Structure, Texture, Properties and Applications), 417-22 (English) 1994. CODEN: MRSPDH. ISSN: 0272-9172.

AB The authors have studied the structural properties of Ni80Fe20 thin films **sputtered** on silicon with Cr, Ta and SiO2 buffer layers using TEM. The authors observe a decrease of the **grain** size when Ta and SiO2 underlayers are used instead of Cr. Permalloy films **deposited** on **Ta** layers are strongly (**111**) textured while those grown on Cr and SiO2 are mostly randomly oriented. The results are discussed with respect to the nanostructure of both Ta, Cr and SiO2 underlayers and in relation to the variation of the magnetic softness obsd. in this system.

CC 77-1 (Magnetic Phenomena)
Section cross-reference(s): 56

ST **sputtering** nickel iron permalloy magnetic film

IT Magnetic structure
(soft; texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr and Ta and SiO2 buffer layers)

IT **Sputtering**
Surface structure
(texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr and Ta and SiO2 buffer layers)

IT 7440-25-7, Tantalum, properties 7440-47-3, Chromium, properties 7631-86-9, Silica, properties
RL: MSC (Miscellaneous); PRP (Properties)
(texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr and Ta and SiO2 buffer layers)

IT 39443-13-5
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr and Ta and SiO2 buffer layers)

L33 ANSWER 9 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1994:589937 Document No. 121:189937 Problem of tantalum coprecipitation during electrodeposition of niobium from molten salts. Grinevich, V. V.; Kuznetsov, S. A.; Polyakov, E. G.; Sevryukova, L. M. (Moscow, Russia). Metally (3), 18-25 (Russian) 1994. CODEN: MEALET. ISSN: 0869-5733.
AB The electrochem. behavior of tantalum and niobium during their codeposition from fluoride-chloride melts was studied. The content of components in the electrodeposit depended on electrodeposition conditions. By adjusting the electrodeposition conditions, the **pure** niobium or alloys with required compn. could be obtained.
CC 72-8 (Electrochemistry)
ST tantalum niobium alloy electrodeposition; **deposition** fluoride chloride melt
IT **16924-00-8**, Dipotassium heptafluorotantalate 16924-03-1, Dipotassium heptafluoroniobate
RL: RCT (Reactant); RACT (Reactant or reagent)
(electrodeposition of niobium or niobium-tantalum alloys from chloride-fluoride melts)
IT **16924-00-8**, Dipotassium heptafluorotantalate
RL: RCT (Reactant); RACT (Reactant or reagent)
(electrodeposition of niobium or niobium-tantalum alloys from chloride-fluoride melts)

L33 ANSWER 10 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1992:434373 Document No. 117:34373 Microstructural observations of tantalum/aluminum superlattices by TEM. Jiang, S. S.; Zou, J.; Cockayne, D. J. H.; Sikorski, A.; Hu, A.; Peng, R. W. (Electron Microsc. Unit, Univ. Sydney, Sydney, 2006, Australia). Physica Status Solidi A: Applied Research, 130(2), 373-81 (English) 1992. CODEN: PSSABA. ISSN: 0031-8965.
AB Ta/Al multilayer films are fabricated by magnetron **sputtering**. Cross-section transmission electron microscopy (XTEM) shows the well-formed layer structures of Ta/Al superlattices. The modulation wavelength of the superlattice can be detd. from the spacing of high order satellites in the low angle regions of both electron and x-ray diffraction patterns. The in-plane structures of Ta and Al are polycryst. and the **grain** sizes of crystals are small. The majority of crystals have **Ta** [110] and Al [**111**] textures in the growth direction of multilayer films. The microstructures of interfaces between **Ta** (110) and Al (**111**) are briefly studied by high resoln. electron microscopy.
CC 66-5 (Surface Chemistry and Colloids)
Section cross-reference(s): 56, 75
ST microstructure tantalum aluminum **sputtered** superlattice; crystallite tantalum aluminum **sputtered** superlattice; interface tantalum aluminum **sputtered** superlattice
IT **Sputtering**
(of tantalum superlattice with aluminum, microstructure from)
IT 7440-25-7, Tantalum, properties
RL: PRP (Properties)
(microstructure of **sputtered** aluminum superlattice with)
IT 7429-90-5, Aluminum, properties
RL: PRP (Properties)
(microstructure of **sputtered** tantalum superlattice with)

L33 ANSWER 11 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1988:136233 Document No. 108:136233 **Sputtering** target from tantalum by sintering. Kyono, Iwao; Hosaka, Hiroshi; Yaegashi, Seiji (Nippon Mining Co., Ltd., Japan). PCT Int. Appl. WO 8707650 A1 19871217, 27 pp. DESIGNATED STATES: W: DE, US. (Japanese). CODEN: PIXXD2. APPLICATION: WO 1987-JP365 19870609. PRIORITY: JP 1986-133802 19860611.

AB The **sputtering** target for forming high-quality Ta2O5 elec. insulating films and metallic Ta electrode films is manufd. from **purified** Ta contg. alkali metals .ltoreq.0.05, radioactive elements .ltoreq.0.005, and transition metals .ltoreq.3 ppm. The metallic Ta is prepd. from an acid-dissolved Ta compd. by forming K2TaF7 crystals for redn. with Na and then drying. Thus, 11 kg Ta2O5 powder was dissolved in 18 kg aq. 50% HF at 80.degree., and the soln. was filtered with pore size of 0.2.mu.. The filtrate was mixed with 3 kg **pure** KCl in 18 L tap water at 80.degree., and then with 6 L of slowly added Ta salt. K2TaF7 was pptd., filtered, washed with aq. 100 g KF/L, dried, and then reduced with Na at 800.degree. to form powd. Ta, KF, and NaF. The Ta powder was cold-pressed at 1500 kg/cm2, hot-isostatically pressed 1 h at 1000 kg/cm2 and 1400.degree., and then melted with an electron beam to obtain a Ta target contg. <1 ppm each of Nb, Mo, W, and Zr.

IC ICM C23C014-34

CC 56-4 (Nonferrous Metals and Alloys)
Section cross-reference(s): 76

ST tantalum powder sintering **sputtering** target; potassium tantalum fluoride redn sodium

IT **Sputtering**
(tantalum target for, high-**purity** powder for sintered)

IT Electric insulators and Dielectrics
(coatings, tantalum oxide, **sputtering** target for, manuf. of sintered)

IT Electrodes
(film, tantalum, high-**purity** **sputtering** target for)

IT 7440-25-7P, Tantalum, preparation
RL: PREP (Preparation)
(powder, **purifn.** of, for sintered **sputtering** target manuf.)

IT 59763-75-6P, Tantalum oxide
RL: PUR (Purification or recovery); PREP (Preparation)
(**purifn.** of, for sintered **sputtering** target manuf.)

IT **16924-00-8**, Potassium tantalum fluoride (K2Taf7)
RL: RCT (Reactant); RACT (Reactant or reagent)
(redn. of, with sodium, for high-**purity** tantalum **sputtering** target)

IT 7440-23-5, Sodium, reactions
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(redn. with, of potassium-tantalum fluoride, in manuf. of high-**purity** tantalum **sputtering** target)

IT **16924-00-8**, Potassium tantalum fluoride (K2Taf7)
RL: RCT (Reactant); RACT (Reactant or reagent)
(redn. of, with sodium, for high-**purity** tantalum **sputtering** target)

L33 ANSWER 12 OF 14 HCAPLUS COPYRIGHT 2002 ACS

1979:481639 Document No. 91:81639 Effect of formation conditions on the structure of tantalum vacuum condensates. Komashko, V. A.; Anukhin, A. I.; Voitovich, I. D.; Titenko, Yu. V.; Chugaev, V. N. (Kiev, USSR). Fiz. Khim. Obrab. Mater. (3), 97-102 (Russian) 1979. CODEN: FKOMAT. ISSN: 0015-3214.

AB The effect of technol. parameters of condensation on the structure, **grain** size, and microstress in Ta films was investigated by x-ray diffraction, electron diffraction, an electron microscopy. The thickness of the Ta layer and the temp. of the substrate in the **deposition** process have significant effects on the film structure. Epitaxial layers with orientation (11.hivin.2) [**111**] **Ta** || (10.hivin.10)[0001] .alpha.-Al2O3 were formed on sapphire at 900-950.degree..

CC 75-1 (Crystallization and Crystal Structure)

L33 ANSWER 13 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1973:105083 Document No. 78:105083 Examination of irradiated uranium nitride fuel clad with tungsten-rhenium or T-**111** alloy. Cuneo, D. R.; Long, E. L., Jr.; Jostsons, A.; Washburn, T. N. (Oak Ridge Natl. Lab., Oak Ridge, TN, USA). Report, ORNL-TM-3895, 46 pp. Avail. Dep. NTIS From: Nucl. Sci. Abstr. 1973, 27(1), 614 (English) 1972.
AB Three fuel pins contg. UN pellets were irradiated in the thermal n flux of the ORR for 5800 hr to a peak burnup of 1.75 at.%. The pin with 2-25% Re cladding performed satisfactorily with the cladding outer surface at 1300.degree.. The 2 pins with T-**111** (**Ta**-8% W-2% Hf) cladding, which had an inner liner of chem. vapor **deposited** W, operated with the cladding outer surface at 1400.degree.. The T-**111** on one of the pins failed during the test by intergranular fracture. The **grain** size in the failed region was 6 times that in the gas plenum region, indicating that failure was caused by a localized hot spot. However, numerous cracks and cavities were found in other regions of the T-**111** cladding of both the failed and unfailed pins; the cladding on both of these pins would have untimately failed without the hot spot. Hf-rich areas, with concns. 30-40 times that in the homogeneous alloy, were detected by electron microprobe examn. at the cracks and cavities in both the T-**111** and the W liner. The mechanism of the test-induced concn. of Hf was not detd. The UN fuel performed satisfactorily in all 3 pins. The fission-gas release wqas only 0.1% at 1380.degree. (top pin) and 7.1% at 1500.degree. (bottom pin). Swelling of the fuel was adequately restrained by the cladding and was limited to closing of the as-fabricated 0.005-in. gap between the fuel and cladding. No gross chem. reaction occurred between the fuel and cladding. Although they interacted to a depth of .apprx.20 .mu.m, electron microprobe anal. of the cladding revealed no U penetration beyond that depth. N released from the UN may have interacted with the T-**111** and led to the degradation of its mech. properties.
CC 76-6 (Nuclear Technology)

L33 ANSWER 14 OF 14 HCAPLUS COPYRIGHT 2002 ACS
1968:464102 Document No. 69:64102 Comparative study of the electrocrystallization of tantalum and niobium from molten fluoride mixtures. Decroly, Cl.; Mukhtar, A.; Winand, R. (Free Univ. Brussels, Brussels, Belg.). J. Electrochem. Soc., 115(9), 905-12 (English) 1968. CODEN: JESOAN.
AB A comparison has been made of the electrocrystn. of Ta and Nb from baths contg. either KF and K2TaF7 or KF and K2NbF7 in order to det. why current efficiencies are generally much lower for Nb than for Ta under the same exptl. conditions. The phase diagram of the system KF-K2NbF7 was drawn. Comparison with the diagrams of the system KF-K2TaF7 found in the literature does not give any evidence for a basic difference in the nature of the ionic species present in both types of baths. An increase of the K2NbF7 or K2TaF7 content of the bath results in a considerable decrease of the current efficiency. This effect is much more striking for Nb than for Ta. The **grain** size decreases also when the K2NbF7 or K2TaF7 content of the bath increases. The current efficiency increases roughly with the cathodic c.d. while the **grain** size shows a very complex behavior against the same parameter. The current efficiency decreases and the **grain** size increases when the length of the electrolysis increases. The **grain** size decreases regularly when the temp. increases, while the current efficiency passes through a max. at .apprx.900.degree.. Cathodic polarization curves drawn in both types of bath have shown a rather complex behavior of the ionic species to be discharged at the cathode. It appears that some part of the metallic

deposit at the cathode is removed from it by the agitation of the bath and by its own wt. and is redissolved in the bath through a chem. reaction giving rise to lower valency species. A part of these species is reoxidized at the anode, and another part of them participates again in the cathodic process. This phenomenon is much more effective for Nb than for Ta in the same type of bath. All the exptl. observations are interpreted in terms of this mechanism. 31 references.

CC 77 (Electrochemistry)

IT Electric current
(efficiency, in **deposition** of niobium and tantalum from fluoride fused mixts.)

IT **16924-00-8**
RL: PRP (Properties)
(phase diagram with potassium fluoride, electrodeposition of tantalum in relation to)

IT **16924-00-8**
RL: PRP (Properties)
(phase diagram with potassium fluoride, electrodeposition of tantalum in relation to)

=> d L35 1-38 ti

L35 ANSWER 1 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI **Deposition** and thermal diffusion of borides and carbides of refractory metals

L35 ANSWER 2 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Process for treating metallic materials to be used as electrodes

L35 ANSWER 3 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Treatments for TaC formation on graphite surface. Part II: Electrodeposition from molten fluorides

L35 ANSWER 4 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI The corrosion protection of nickel equipment in chloride-fluorotantalate melts

L35 ANSWER 5 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI The effect of the melt composition on electrode processes and structure of tantalum-boride coatings

L35 ANSWER 6 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI The behavior of nickel in tantalum-containing melts

L35 ANSWER 7 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Metallothermic reduction as an electronically mediated reaction

L35 ANSWER 8 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Study of electrode processes in flinak-K2TaF7-KBF4 melt

L35 ANSWER 9 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Effect of oxygen on the complexing and electrochemical processes in the NaCl-KCl-K2TaF7 melt

L35 ANSWER 10 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Voltammetric studies of tantalum electrodeposition baths

L35 ANSWER 11 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Electrochemical synthesis of transition metal diborides from molten salts

L35 ANSWER 12 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Secondary processes during tantalum electrodeposition in molten salts

L35 ANSWER 13 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Electrodeposition of tantalum in sodium chloride-potassium chloride-dipotassium heptafluorotantalate melts

L35 ANSWER 14 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Studies of the electroreduction of tantalum and niobium in fluorochloroaluminate melts

L35 ANSWER 15 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Electrodeposition of tantalum coatings on metallic substrates such as steel

L35 ANSWER 16 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Electrolytic production of niobium with a low oxygen content

L35 ANSWER 17 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Disproportionation reaction in molten salts and their application to surface coating treatment

L35 ANSWER 18 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI On the electrodeposition and characterization of niobium from fused fluoride electrolytes

L35 ANSWER 19 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Corrosion resistance of sintered and pyrolytic boron nitride in salt melts

L35 ANSWER 20 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Porous tantalum capacitor electrode

L35 ANSWER 21 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Effects of alloy composition in alleviating embrittlement problems associated with the **tantalum** alloy T-**111**

L35 ANSWER 22 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Evaluation of T-**111** forced-convection loop tested with lithium at 1370.deg.

L35 ANSWER 23 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Effects of alloy composition in alleviating embrittlement problems associated with the **tantalum** alloy T-**111**

L35 ANSWER 24 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Effect of long-time, elevated-temperature exposures to vacuum and lithium on the properties of a **tantalum** alloy, T-**111**

L35 ANSWER 25 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Interaction of high-temperature strength and weldability

L35 ANSWER 26 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Oxidation of tantalum

L35 ANSWER 27 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Effect of aging at 1040.deg. (1900.deg.F) on the ductility and structure of a **tantalum** alloy, T-**111**

L35 ANSWER 28 OF 38 HCAPLUS COPYRIGHT 2002 ACS

TI Preparation of replicas guaranteeing diffraction contrast of the image

L35 ANSWER 29 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Influence of vacuum environment on the composition, structure, and mechanical behavior of the tantalum-tungsten-hafnium alloy T-**111**

L35 ANSWER 30 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Oxide platelet formation in bulk tantalum

L35 ANSWER 31 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Heats of formation of fluoroniobates and fluorotantalates of alkali metals and ammonia

L35 ANSWER 32 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Precipitation strengthened tantalum-base alloys

L35 ANSWER 33 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Thermal stability of refractory metal alloys

L35 ANSWER 34 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Compatibility of copper with tantalum-10 wt.% tungsten alloy at elevated temperatures

L35 ANSWER 35 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Determination of weldability and elevated temperature stability of refractory metal alloys. II. Long-time temperature stability of refractory metal alloys

L35 ANSWER 36 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Oxide platelet formation in bulk tantalum

L35 ANSWER 37 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI Columbium-1 zirconium alloy forced convection lithium slave loop test LCCDB-1

L35 ANSWER 38 OF 38 HCAPLUS COPYRIGHT 2002 ACS
TI The mechanism of tantalum electrodeposition from oxyfluoride melts

=> d L35 2,5,9,10,12,15,17,20,21,24,26,38 cbib abs hitind hitrn

L35 ANSWER 2 OF 38 HCAPLUS COPYRIGHT 2002 ACS
2002:31121 Document No. 136:76134 Process for treating metallic materials to be used as electrodes. Reid, Veronique; Bulteau, Olivier; Hita, Alain; Savall, Andre; Taxill, Pierre; Palau, Patrice (Electricite de France, Fr.). Eur. Pat. Appl. EP 1170399 A1 20020109, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (French). CODEN: EPXXDW. APPLICATION: EP 2001-401629 20010620. PRIORITY: FR 2000-8899 20000707.
AB The invention concerns process for fabrication metallic electrodes comprising tantalum substrate and metal oxide coating with controlled roughness formed by tantalum electrodeposition in molten salt electrolyte and iridium dioxide coating formation.
IC ICM C25B011-04
CC 72-8 (Electrochemistry)
Section cross-reference(s): 56, 67
IT Coating process
(iridium dioxide coating formation on tantalum electrodeposited by thermal decompn. of **deposits** of IrCl4 soln. in alcs. in process of electrode fabrication)

IT Thermal decomposition
(of **deposit** on tantalum substrate from IrCl4 solns. in alcs. with formation of IrO2 in fabrication of electrode)
IT Heat treatment
(thermal decompn. on tantalum substrate **deposits** from alc. soln. of IrCl4 in process of fabrication of electrodes, by)
IT **16924-00-8**, Potassium heptafluorotantalate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(Ta electrodeposition on tantalum substrate in process of fabrication of electrodes from fluoride melt contg.)
IT 7782-44-7, Oxygen, reactions
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(thermal decompn. of **deposit** on tantalum substrate from IrCl4 solns. in alcs. with formation of IrO2 in atm. of)
IT 29063-28-3, Octanol 35296-72-1, Butanol
RL: NUU (Other use, unclassified); USES (Uses)
(thermal decompn. on tantalum substrate **deposits** from alc. soln. of IrCl4 in process of fabrication of electrodes)
IT 64-17-5, Ethanol, uses
RL: NUU (Other use, unclassified); USES (Uses)
(thermal decompn. on tantalum substrate **deposits** from ethanol soln. of IrCl4 in process of fabrication of electrodes)
IT 67-56-1, Methanol, uses
RL: NUU (Other use, unclassified); USES (Uses)
(thermal decompn. on tantalum substrate **deposits** from methanol soln. of IrCl4 in process of fabrication of electrodes)
IT **16924-00-8**, Potassium heptafluorotantalate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(Ta electrodeposition on tantalum substrate in process of fabrication of electrodes from fluoride melt contg.)

L35 ANSWER 5 OF 38 HCAPLUS COPYRIGHT 2002 ACS
2000:298170 Document No. 133:10170 The effect of the melt composition on electrode processes and structure of tantalum-boride coatings. Makarova, O. V.; Polyakova, L. P.; Polyakov, E. G.; Shevyryov, A. A.; Bjerrum, N. J. (-Institute of Chemistry KSC RAS, Apatity, 184200, Russia). Proceedings - Electrochemical Society, 99-41(Molten Salts XII), 645-650 (English) 2000. CODEN: PESODO. ISSN: 0161-6374. Publisher: Electrochemical Society.
AB A comparative study of the mechanism of electrode processes and structure of cathodic **deposits** in FLINAK-K2TaF7-KBF4 and FLINAK-K3TaOF6-Na3B3O3F6 melts was carried out in the temp. interval 700-750.degree.. The electrochem. behavior of boron and tantalum was studied by linear, cyclic and square-wave voltammetry. The products of interaction between the melt components were detd. by the methods of x-ray diffraction, IR spectroscopy, chem. anal. and optical crystallog. Microprobe anal., x-ray diffraction, SIMS, XPS, AES, optical SEM and STM were used for characterization of cathodic **deposits**. The governing role of oxygen in the process of interaction between tantalum and boron-contg. components of the melt is shown. While not reacting with each other in the fluoride melt, they form complex species in the oxofluoride melt, with, probably, an oxygen bridge between tantalum and boron. Changing the melt structure results in a changed structure of the cathodic **deposit**. In fluoride melts multi-phase cryst. **deposits** are formed at the cathode. In oxofluoride electrolytes the cathode is plated with a laminated x-ray amorphous layer. Even fine techniques have not allowed to reveal the nature of individual microlayers of the **deposit** so far.

CC 72-2 (Electrochemistry)
Section cross-reference(s): 68
IT 14075-53-7, Potassium tetrafluoroborate(1-) **16924-00-8**
19052-40-5 54530-91-5, Tripotassium hexafluorooxotantalate(3-)
RL: NUU (Other use, unclassified); PRP (Properties); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(electrodeposition of tantalum boride from FLINAK-K2TaF7-KBF4 and FLINAK-K3TaOF6-Na3B3O3F6 melts)
IT **16924-00-8**
RL: NUU (Other use, unclassified); PRP (Properties); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(electrodeposition of tantalum boride from FLINAK-K2TaF7-KBF4 and FLINAK-K3TaOF6-Na3B3O3F6 melts)

L35 ANSWER 9 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1997:653340 Document No. 127:338525 Effect of oxygen on the complexing and electrochemical processes in the NaCl-KCl-K2TaF7 melt. Polyakova, L. P.; Kononova, Z. A.; Kremenetskii, V. G.; Polyakov, E. G. (Kola Research Center, Institute of Rare Element and Mineral Chemistry and Technology, Russian Academy of Sciences, Apatity, 184200, Russia). Russian Journal of Electrochemistry (Translation of Elektrokhimiya), 33(9), 1009-1018 (English) 1997. CODEN: RJELE3. ISSN: 1023-1935. Publisher: MAIK Nauka/Interperiodica.
AB The influence of O on the electrochem. behavior of Ta during titrn. of the NaCl-KCl-K2TaF7 melt with Na oxide was studied by the linear voltammetry method. As O replaces the F in the ligand shell of the TaClF73- complex, the peak corresponding to it diminishes, and a peak of discharge of Ta hydroxyhalide appears and grows in the more neg. region of potentials. At the molar ratio O/Ta = 1, Ta reduces from TaOClF53-, which is the only complex obsd. in the melt. The Ta redn. at polarization rates .nu. .gtoreq. 1 V s-1 occurs irreversibly. The diffusion coeff. for TaOClF53- at 750.degree. is .apprx.1.1 .times. 10-5 cm2 s-1. At .nu. < 1 V s-1, the redn. process is complicated by the formation of Ta hydroxycarbides at the glassy-C electrode and intermetallic Pt-Ta compds. at the Pt electrode. No addnl. peaks appear in the voltammograms upon a further titrn. of the melt with Na oxide (1 < O/Ta < 2.4), but the height of the current peak corresponding to the redn. of the TaOClF53- complexes decreases because of the formation of the K0.4TaO2.4F0.6 compd. which is insol. in the melt. An increase in the O/Ta ratio >2.4 leads to the Ta concn. in the melt dropping to zero and to **depositing** on the crucible bottom of KTaO3 along with K0.4TaO2.4F0.6.
CC 72-5 (Electrochemistry)
Section cross-reference(s): 78
IT 7440-06-4, Platinum, uses 7447-40-7, Potassium chloride, uses 7647-14-5, Sodium chloride, uses **16924-00-8**, Dipotassium heptafluorotantalate
RL: NUU (Other use, unclassified); USES (Uses)
(effect of oxygen on complexing and electrochem. processes in NaCl-KCl-K2TaF7 melt)
IT **16924-00-8**, Dipotassium heptafluorotantalate
RL: NUU (Other use, unclassified); USES (Uses)
(effect of oxygen on complexing and electrochem. processes in NaCl-KCl-K2TaF7 melt)

L35 ANSWER 10 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1995:560579 Document No. 122:324848 Voltammetric studies of tantalum electrodeposition baths. Chamelot, Pierre; Taxil, Pierre; Lafage, Bernard (Lab. Chim. Electrochim., Univ. Paul-Sabatier, Toulouse, 31062, Fr.). Electrochimica Acta, 39(17), 2571-5 (English) 1994. CODEN: ELCAAV. ISSN: 0013-4686. Publisher: Elsevier.

AB **Deposits** of tantalum were prepd. at 780.degree. by redn. of K2TaF7, the solvent being a eutectic LiF-NaF mixt. Cyclic voltammetry and square-wave voltammetry were used to demonstrate the competition exerted on the redn. of the TaF72- ions leading to **deposition** of tantalum oxide by redn. of the tantalum oxyfluoride ions [TaOFn(n-3)-, probably with n = 5]. The use of square-wave voltammetry enabled the attribution of a peak to each the reactions and, from the peak current produced by TaF72- its calibration curve to be established. This curve was used in monitoring the level of TaF72- during the **deposition** process.

CC 72-8 (Electrochemistry)
Section cross-reference(s): 68, 79

IT **16924-00-8**
RL: ANT (Analyte); PRP (Properties); RCT (Reactant); ANST (Analytical study); RACT (Reactant or reagent)
(electroredn. in Ta electrodeposition from K2TaF7 in LiF-NaF eutectic)

IT **16924-00-8**
RL: ANT (Analyte); PRP (Properties); RCT (Reactant); ANST (Analytical study); RACT (Reactant or reagent)
(electroredn. in Ta electrodeposition from K2TaF7 in LiF-NaF eutectic)

L35 ANSWER 12 OF 38 HCAPLUS COPYRIGHT 2002 ACS

1992:499622 Document No. 117:99622 Secondary processes during tantalum electrodeposition in molten salts. Polyakova, L. P.; Polyakov, E. G.; Sorokin, A. I.; Stangrit, P. T. (Inst. Chem., Kola Sci. Cent., Apatity, 184200, Russia). Journal of Applied Electrochemistry, 22(7), 628-37 (English) 1992. CODEN: JAELBJ. ISSN: 0021-891X.

AB A comparative study of cathodic and anodic processes during the electrolysis of Ta-contg. chloride and chloride-fluoride melts is presented. The substitution of Cl- by F- in the ligand shells of Ta(IV) and Ta(V) species is proposed as the basis for a mechanism for the formation of sludge and the outgrowth of films from the electrode over the surface of the electrolyte during Ta electrodeposition employing a sol. anode configuration.

CC 72-8 (Electrochemistry)
Section cross-reference(s): 56, 68

IT Slimes and Sludges
(formation of, in tantalum **deposition** from molten salts)

IT 7783-71-3, Tantalum pentafluoride **16924-00-8**
RL: USES (Uses)
(voltammetry of, in cesium chloride-potassium chloride-sodium chloride melt, tantalum electrodeposition and anodic dissoln. in relation to)

IT **16924-00-8**
RL: USES (Uses)
(voltammetry of, in cesium chloride-potassium chloride-sodium chloride melt, tantalum electrodeposition and anodic dissoln. in relation to)

L35 ANSWER 15 OF 38 HCAPLUS COPYRIGHT 2002 ACS

1992:183529 Document No. 116:183529 Electrodeposition of tantalum coatings on metallic substrates such as steel. Szklarski, Wojciech; Los, Przemyslaw; Bogacz, Aleksander; Josiak, Jerzy (Politechnika Wroclawska, Pol.; Akademia Medyczna, Wroclaw). Pol. PL 153113 B1 19910329, 5 pp. Abstracted and indexed from the unexamined application. (Polish). CODEN: POXXA7. APPLICATION: PL 1987-269822 19871229.

AB The **deposition** is carried out by electrolysis of molten salts contg. Ta, Li, and K compds. A bath with compn. LiF 20-27, KF 48-62, K2TaF7 10-30, K2NiI4 0.3-1.4 and NH4HF2 3-5 wt.% was used. A Ta foil, in the shape of the plated substrate, was used as an anode. An atm. of neutral gas was maintained during the electrolysis. After finishing the process, the bath was cooled to the crystn. temp. Subsequently, the

Ta-plated product was immersed above the bath and cooled under neutral gas to .apprx.370 K. Electrolysis was carried out at c.d. 0.05-0.06 A/cm and 1070-1200 K.
IC ICM C25D003-66
CC 72-8 (Electrochemistry)
IT 1341-49-7, Ammonium hydrogen difluoride 7789-23-3, Potassium fluoride 7789-24-4, Lithium fluoride, uses **16924-00-8** 140212-81-3
RL: USES (Uses)
(electrodeposition of tantalum on metallic substrates from baths contg.)
IT **16924-00-8**
RL: USES (Uses)
(electrodeposition of tantalum on metallic substrates from baths contg.)

L35 ANSWER 17 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1988:25690 Document No. 108:25690 Disproportionation reaction in molten salts and their application to surface coating treatment. Oki, Takeo (Fac. Eng., Nagoya Univ., Nagoya, 464, Japan). Proceedings - Electrochemical Society, 87-7(Proc. Jt. Int. Symp. Molten Salts), 765-74 (English) 1987. CODEN: PESODO. ISSN: 0161-6374.
AB Surface coating treatment by chem. transport using disproportionation reactions in molten salts was studied. The metal such as Si, Cr, Ti, V, Zr, and Ta was **deposited** to form alloy and compd. coating on the surface by application of a disproportionation reaction in molten halide salts of the KCl-BaCl2-NaF-Me-Me salt system. The overall reaction was represented as follows where M was a metal and a the activity: M(a1:in source) .fwdarw. M(a2:in metal or compds.) (a1>a2). Various films were coated on steels by this method; ferrosilicon and ferrosilicon-graphite composite, Cr3C2, TiC, VC, TaC, and boride films of these metals. The Vickers surface hardness (Hv) of these films was 1000-3000 and they had very high wear resistance.
CC 56-6 (Nonferrous Metals and Alloys)
Section cross-reference(s): 55
IT 7718-98-1, Vanadium chloride (VCl3) 7788-97-8, Chromium fluoride (CrF3) 16919-27-0, Potassium titanium fluoride (K2TiF6) 16923-95-8 **16924-00-8**, Potassium tantalum fluoride (K2TaF7)
RL: USES (Uses)
(molten salt contg., for coating of steel with carbide, disproportionation reaction in)
IT **16924-00-8**, Potassium tantalum fluoride (K2TaF7)
RL: USES (Uses)
(molten salt contg., for coating of steel with carbide, disproportionation reaction in)

L35 ANSWER 20 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1984:201983 Document No. 100:201983 Porous tantalum capacitor electrode. Love, Gordon Ross (Sprague Electric Co., USA). Eur. Pat. Appl. EP 104759 A1 19840404, 13 pp. DESIGNATED STATES: R: BE, DE, FR, GB, IT, NL. (English). CODEN: EPXXDW. APPLICATION: EP 1983-304848 19830823. PRIORITY: US 1982-423966 19820927.
AB A porous Ta capacitor electrode is described which consists of a Ta wire and an electroplated high-surface-area Ta sponge covering only a portion of the wire. The electrode is made by inserting a portion of a Ta wire, as the cathode, in an electroplating cell contg. a soln. of a Ta fluoride in a molten alkali metal halide, and passing sufficient current to **deposit** a high-surface-area Ta sponge on to the Ta wire portion. In a preferred example, granules of KF, NaF, and LiF were mixed in about equal molar amts. with .apprx.30 wt.% K2TaF7 and melted together at <800.degree.. The electrolyte was stabilized at 825.degree., Ta lead

wires inserted into it, and a current of 0.3 A/cm2 maintained on their surfaces for .apprx.30 s. The Ta sponge grown on the immersed portions of the lead wires were anodized at 70 V in 0.1% H2SO4 at 80.degree. for 2 h. Electroplating currents of 0.37 and 0.42 A/cm2 were used in other examples.
IC H01G009-05; H01G009-00; C25D007-06; C25D003-66
CC 76-10 (Electric Phenomena)
Section cross-reference(s): 72
IT **16924-00-8**
RL: USES (Uses)
(electrodeposition of porous tantalum capacitor electrode from molten mixt. contg.)
IT **16924-00-8**
RL: USES (Uses)
(electrodeposition of porous tantalum capacitor electrode from molten mixt. contg.)

L35 ANSWER 21 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1977:125557 Document No. 86:125557 Effects of alloy composition in alleviating embrittlement problems associated with the **tantalum** alloy T-**111**. Stephens, Joseph R. (Lewis Res. Cent., NASA, Cleveland, Ohio, USA). J. Less-Common Met., 51(1), 93-111 (English) 1977. CODEN: JCOMAH.
AB The causes of aging embrittlement in T-**111** [11137-08-9] **Ta** alloy and the effects of alloy modification were investigated. T-**111** contains a crit. combination of W and Hf that leads to loss of ductility at -196.degree. after aging near 1040.degree.. W probably enhances Hf segregation to **grain** boundaries. This also leads to increased susceptibility to H embrittlement. Aging embrittlement was not obsd. in Ta alloys with lower W or Hf contents. However, most of the alloys had lower strength than T-**111** and exhibited susceptibility to H embrittlement.
CC 56-7 (Nonferrous Metals and Alloys)

L35 ANSWER 24 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1974:510028 Document No. 81:110028 Effect of long-time, elevated-temperature exposures to vacuum and lithium on the properties of a **tantalum** alloy, T-**111**. Buzzard, Robert J.; Sheffler, Keith D. (Lewis Res. Cent., NASA, Cleveland, Ohio, USA). NASA Tech. Note, NASA TN D-7548, 30 pp. (English) 1974. CODEN: NASCA3.
AB The effect of exposure to vacuum and molten Li at 980, 1040, and 1315.degree. for 100-500 hr on the bend, tensile, and creep strength of T-**111** sheet was investigated. The interstitial elements, C, N, and H, remained const. at 30, 6-14, and 1 ppm, resp. In vacuum, the O content remained at the initial level of 30 ppm except after 5000 hr at 1315.degree.. In the Li-exposed specimens, the O was reduced to 3-12 ppm. There was no **grain** growth until 1315.degree., at which temp. there was a 4-fold increase in the av. **grain** diam. There was no loss in bend ductility for any exposure. The tensile strength from room temp. to 1315.degree. decreased (<17%) after all exposures. The long-term exposures in Li were most detrimental. The life to 1% creep strain was greatly reduced at 900-1000.degree.. The greatest redns. occurred for specimens exposed to long-term duplex temp. exposures in either vacuum or Li. The losses in strength were believed to be due to losses in O and **grain** growth.
CC 56-7 (Nonferrous Metals and Alloys)

L35 ANSWER 26 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1973:75272 Document No. 78:75272 Oxidation of tantalum. Lawless, Kenneth R.; Kampe, Dennis J. (Res. Lab. Eng. Sci., Univ. Virginia,

Charlottesville, Va., USA). U. S. Nat. Tech. Inform. Serv., AD Rep., No. 745341, 173 pp. Avail. NTIS From: Govt. Rep. Announce. (U.S.) 1972, 72(17), 91 (English) 1972. CODEN: XADRCH.
AB Scanning electron microscopy in conjunction with transmission electron microscopy and optical microscopy was used to study the initial stages of the oxidn. of high-purity (**111**) and (110) **Ta** single crystals and large-**grained** 5 mil-thick sheet of approx. (001) orientation. Oxidn. temps. were 530 and 800.degree. and pressures 1 atm. and 0.001 torr O.
CC 56-8 (Nonferrous Metals and Alloys)

L35 ANSWER 38 OF 38 HCAPLUS COPYRIGHT 2002 ACS
1966:16748 Document No. 64:16748 Original Reference No. 64:3028d-f The mechanism of tantalum electrodeposition from oxyfluoride melts. Amosov, V. M. (Inst. of Fine Chem. Technol., Moscow). Izv. Vysshikh Uchebn. Zavedenii, Tsvetn. Met., 8(1), 110-20 (Russian) 1965.
AB Thermodynamic analysis of systems **K-Ta**-O-**F**, **K-Ta-F**-Cl, and **K-Ta**-O-**F**-Cl is carried out and free energies and decompn. potentials for the 37-9 possible reactions between the components of the system **K-Ta**-O-**F**-Cl (made up from K3TaClF7, KF, KCl, and Ta2O5) are calcd. Ta2O5 is dissolved by chem. interaction with KF and the complex fluorides K3TaClmFn (where m + n = 8, like K3TaClF7 and K3TaF8. Depending on the chem. compn. of the initial melt (electrolyte), the products of this chem. interaction can be: Ta2O5.2K2TaF7, and complex oxyfluorides KxTaOyFz (like K3TaOF6 and K2TaO2F3). The compd. Ta2O5.2K2TaF7 should decomp. in the presence of adequate amt. of KF, forming the oxyfluoride KxTaOyFz. The summarized chem. reactions presented show what occurs during the electrolytic **deposition** of Ta from the oxy-fluoride melts. 28 references.
CC 15 (Electrochemistry)
IT 7782-44-7, Oxygen
(system, Cl-**F-K-Ta**-)
IT 7782-50-5, Chlorine
(systems, **F**-O-**K-Ta**-, and **F-K-Ta**-)

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L63 ANSWER 1 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 2002:7416670 INSPEC DN A2002-23-8120G-003
TI Effect of temperature and reductant on the production of tantalum powder by metallothermic reduction method.
AU Byung Il Kim (Dept. of Material Sci. & Metall. Eng., Sunchon Nat. Univ., South Korea); Hyeoung Ho Park; In Sung Bae; Jae Sik Yoon
SO Journal of the Japan Institute of Metals (July 2002) vol.66, no.7, p.735-9. 6 refs.

Published by: Japan Inst. Metals
CODEN: NIKGAV ISSN: 0021-4876
SICI: 0021-4876(200207)66:7L.735:ETRP;1-V
DT Journal
TC Experimental
CY Japan
LA Japanese
AB **Pure** tantalum powder has been produced by combining Na as a reducing agent, **K2TaF7** as feed material, KCl and KF as diluents in a stainless steel (SUS) bomb, using the method of metallothermic reduction. The present study investigated the effect of the temperature and the amount of the reductant on the characteristics of tantalum powder in the production process and on the yield. The temperature applied in this study ranged from 800 to 980 degrees C, and the amount of the additional reductant varied from -10%, 0%, 5%, and 10% of the theoretical amount used for the reduction of the entire **K2TaF7**. The results showed that as the temperature and the additional reductant increased, the yield of the powder increased from 57 to 94%, and the particle size also increased from 0.4 to 5.0 mu m. On the other hand, the amount of minute tantalum powder decreased significantly, from 93 to 60%, with increase of temperature and amount of the reductant. At the reduction temperature of 920 degrees C and with the 5% excess of the reductant, the average size of the particle, 2-4 mu m, was closest to that of the particle commonly used, 2-5 mu m. Also, under this condition, impurities contained in the powder were within the limit allowed for the commonly used product. The present study concluded that the optimal condition for manufacturing tantalum powder of the best quality was reduction temperature of 920 degrees C and reductant of 5% excess.
CC A8120G Preparation of metals and alloys (compacts, pseudoalloys); A8120E Powder techniques, compaction and sintering; A8230 Specific chemical reactions; reaction mechanisms
CT IMPURITIES; PARTICLE SIZE; POWDER METALLURGY; REDUCTION (CHEMICAL); TANTALUM
ST temperature effect; reductant effect; tantalum powder production; metallothermic reduction method; Na reducing agent; **K2TaF7 feed material**; KF diluent; KCl diluent; stainless steel bomb; production process; yield; particle size; minute tantalum powder; impurities; optimal condition; best quality; 800 to 980 degC; 0.4 to 5.0 micron; 920 degC; 2 to 4 micron; Ta; **Na-K2TaF7-KCl-KF**; **K2TaF7**; KCl; KF
CHI Ta el; NaK2TaF7KClKF ss, Cl ss, F7 ss, K2 ss, Na ss, Ta ss, F ss, K ss; K2TaF7 ss, F7 ss, K2 ss, Ta ss, F ss, K ss; KCl bin, Cl bin, K bin; KF bin, F bin, K bin
PHP temperature 1.07E+03 to 1.25E+03 K; size 4.0E-07 to 5.0E-06 m; temperature 1.19E+03 K; size 2.0E-06 to 4.0E-06 m
ET Na; F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; Cl*K; KCl; Cl cp; F*K; KF; C; Ta; Cl*F*K*Na*Ta; Cl sy 5; sy 5; F sy 5; K sy 5; Na sy 5; Ta sy 5; Na-K2TaF7-KCl-KF; NaK2TaF7KClKF; Na cp; Cl; F; K; K2TaF

L63 ANSWER 2 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 2000:6569248 INSPEC DN A2000-11-8245-004
TI The study of electrode processes in LiF-NaF-KF-**K2TaF7**-KBF4 melt.
AU Polyakova, L.P.; Polyakov, E.G. (Inst. of Chem., Acad. of Sci., Apatity, Russia); Bjerrum, N.J.
SO Plasmas & Ions (Sept.-Dec. 1999) vol.2, no.3-4, p.117-25. 36 refs.
Published by: Editions Scientifiques et Medicales Elsevier
CODEN: PLIOFP ISSN: 1288-3255
SICI: 1288-3255(199909/12)2:3/4L.117:SEPK;1-9
DT Journal
TC Experimental

CY France
LA English
AB The electrode processes in the FLINAK-**K2TaF7**-KBF4 melt were studied by the method of linear voltammetry with a silver working electrode at the temperature of 700-750 degrees C. In order to eliminate possible errors, two approaches were used, namely KBF4 addition to the FLINAK-**K2TaF7** melt and **K2TaF7** addition to the FLINAK-KBF4 melt. During the experiment the oxygen content in the melt was constantly monitored by linear voltammetry with a glassy carbon electrode. It was shown that depending on the B/Ta molar ratio in the melt the voltammograms had at least one peak. So, at B/Ta=1 two cathodic peaks can be seen. Electrolysis of this melt at increasing current density leads to the formation of Tacub, then Tatetragon and a mixture of tantalum with borides. Further increase of B/Ta results in a greater number of cathodic peaks, as well as the appearance of TaB7 and elemental boron in the cathodic **deposit** alongside with the aforementioned phases. In the electrolytes studied no corroboration of the existence of tantalum and boron heteronuclear complexes has been found. The addition of sodium oxide to the melt in question simplifies the shape of cyclic voltammograms of the FLINAK-**K2TaF7**-KBF4 melt considerably.
CC A8245 Electrochemistry and electrophoresis; A8280F Electrochemical analytical methods
CT ELECTROLYSIS; LITHIUM COMPOUNDS; POTASSIUM COMPOUNDS; SODIUM COMPOUNDS; VOLTAMMETRY (CHEMICAL ANALYSIS)
ST electrode processes; **LiF-NaF-KF-K2TaF7-KBF4 melt**; **FLINAK-K2TaF7-KBF4 melt**; linear voltammetry; glassy C electrode; B/Ta molar ratio; voltammograms; cathodic peaks; electrolysis; current density; **cathodic deposit**; cyclic voltammograms; 700 to 750 K; **LiF-NaF-KF-K2TaF7-KBF4**
CHI LiFNaFKFK2TaF7KBF4 ss, F4 ss, F7 ss, K2 ss, Li ss, Na ss, Ta ss, B ss, F ss, K ss
PHP temperature 7.0E+02 to 7.5E+02 K
ET B*F*K*Li*Na*Ta; B sy 6; sy 6; F sy 6; K sy 6; Li sy 6; Na sy 6; Ta sy 6; LiF; Li cp; cp; F cp; NaF; Na cp; KF; K cp; K2TaF7; Ta cp; KBF4; B cp; LiF-NaF-KF-K2TaF7-KBF4; B*F*K*Ta; B sy 4; sy 4; F sy 4; K sy 4; Ta sy 4; K2TaF7-KBF4; C; B*F*K; F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; Tacub; Tatetragon; B*Ta; TaB7; B; LiFNaFKFK2TaF7KBF; F; K; Li; Na; Ta

L63 ANSWER 3 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1996:5440392 INSPEC DN A9702-8160B-007
TI Tantalum **deposit** on nickel by molten salt electrolysis and its corrosion resistance.
AU Hara, M.; Sato, Y.; Nakagawa, T. (Dept. of Mater. Eng. & Appl. Chem., Akita Univ., Japan)
SO Journal of the Japan Institute of Metals (Oct. 1996) vol.60, no.10, p.962-9. 9 refs.
Published by: Japan Inst. Metals
CODEN: NIKGAV ISSN: 0021-4876
SICI: 0021-4876(199610)60:10L.962:TDNM;1-C
DT Journal
TC Experimental
CY Japan
LA Japanese
AB The electrodeposition of tantalum on a nickel substrate was tried by using an equimolar NaCl-KCl molten salt containing 2.5 mol%**K2TaF7** at 1073 K in air as an electrolyte. The electrodeposition was carried out by a cathodic potentiostatic polarization method. The mass of the electrodeposited material showed a maximum value in a potential region from -0.85 to -0.95 V (vs. Ag/Ag+(0.1)). The morphology and constituent of the electrodeposit were examined by SEM observation and EPMA and X-ray

diffraction analysis. It was found that the **deposit** formed at -0.85 V consisted of a thin inner layer and a thick outer layer. The inner layer was dense and consisted mainly of the TaNi2 intermetallic compound, whereas the outer layer was not dense and consisted of delta -Ta2O5 and metallic tantalum crystals. The nickel specimen covered with the electrodeposit showed spontaneous passivation behavior in a similar manner as **pure** tantalum in a hot HNO3 solution. The high corrosion resistance of the specimen was probably attributable to the spontaneous passivation behavior of the thin inner layer consisting mainly of a Ta-Ni alloy.

CC A8160B Surface treatment and degradation of metals and alloys; A6855 Thin film growth, structure, and epitaxy; A8115L Deposition from liquid phases (melts and solutions)

CT CORROSION; ELECTRODEPOSITION; ELECTRODEPOSITS; ELECTRON PROBE ANALYSIS; HIGH-TEMPERATURE EFFECTS; NICKEL; PASSIVATION; SCANNING ELECTRON MICROSCOPY; SUBSTRATES; TANTALUM; X-RAY DIFFRACTION

ST **Ta deposit**; molten salt electrolysis; corrosion resistance; electrodeposition; Ni substrate; equimolar NaCl-KCl molten salt; **K2TaF7**; electrolyte; cathodic potentiostatic polarization method; electrodeposited material; morphology; SEM observation; EPMA; X-ray diffraction analysis; thin inner layer; thick outer layer; TaNi2 intermetallic compound; delta -Ta2O5; metallic Ta crystals; spontaneous passivation behavior; hot HNO3 solution; 1073 K; **NaCl-KCl-K2TaF7** ; Ta; Ni; TaNi2; Ta2O5; HNO3

CHI NaClKClK2TaF7 ss, Cl ss, F7 ss, K2 ss, Na ss, Ta ss, F ss, K ss; Ta sur, Ta el; Ni sur, Ni el; TaNi2 sur, Ni2 sur, Ni sur, Ta sur, TaNi2 bin, Ni2 bin, Ni bin, Ta bin; Ta2O5 bin, Ta2 bin, O5 bin, Ta bin, O bin; HNO3 ss, NO3 ss, O3 ss, H ss, N ss, O ss

PHP temperature 1.073E+03 K

ET Cl*K*Na; Cl sy 3; sy 3; K sy 3; Na sy 3; NaCl; Na cp; cp; Cl cp; KCl; K cp; NaCl-KCl; F*K*Ta; F sy 3; Ta sy 3; K2TaF7; Ta cp; F cp; Ag; Ni*Ta; Ni sy 2; sy 2; Ta sy 2; TaNi2; Ni cp; O*Ta; Ta2O5; O cp; H*N*O; HNO3; H cp; N cp; Ta-Ni; Ta; Ni; Cl*F*K*Na*Ta; Cl sy 5; sy 5; F sy 5; K sy 5; Na sy 5; Ta sy 5; NaCl-KCl-K2TaF7; NaClKClK2TaF; Cl; F; K; Na; TaNi; Ta2O; O; HNO; N*O; NO

L63 ANSWER 4 OF 17 INSPEC COPYRIGHT 2002 IEE

AN 1992:4268569 INSPEC DN A9223-8120G-011

TI A study on the production of condenser-grade tantalum powder in a semi-batch reactor.

AU In Ju Youn; Kyun Young Park (Korea Inst. of Energy & Resources, Daejeon, South Korea)

SO Journal of the Korean Institute of Metals and Materials (1992) vol.30, no.2, p.137-43. 8 refs.
CODEN: TKHCDJ

DT Journal

TC Experimental

CY Korea, Democratic People's Republic of

LA Korean

AB Using a semi-batch reactor (ID, 7.9 cm; height, 20 cm), experiments have been made on the characteristics of reduction of **K2TaF7** with Na to produce condenser grade tantalum powders. The reaction temperature was controlled by the feed rate of Na. The effects of stirring of the reactant solution, the amount of diluent and the reaction temperature were investigated on the particle size and production yield of the tantalum powder. The **purity** of the tantalum powder was 99.8% and the particle size ranged from 3.45 to 7.15 mu m in terms of the Fisher size.

CC A8120G Specific metals and alloys (compacts, pseudoalloys); A8230 Specific chemical reactions; reaction mechanisms; A8120E Powder techniques, compaction and sintering

CT PARTICLE SIZE; POWDER METALLURGY; REDUCTION (CHEMICAL); TANTALUM
ST condenser grade Ta/el; powder; semi-batch reactor; reduction; reaction temperature; particle size
ET F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; Na; Ta

L63 ANSWER 5 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1988:3068949 INSPEC DN A88034528
TI Electrochemical surface alloying on Ni with Ta and Nb in molten fluorides and properties of Ta-Ni and Nb-Ni alloys.
AU Qiao Zhiyu (Beijing Univ. of Iron & Steel Technol., China); Taxil, P.
SO Acta Metallurgica Sinica (18 April 1987) vol.23, no.2, p.B76-83. 18 refs.
CODEN: CHSPA4 ISSN: 0412-1961
DT Journal
TC Experimental
CY China
LA Chinese
AB The electrochemical alloying on Ni surface with Ta and Nb was carried out in molten LiF-NaF-**K2TaF7** or LiF-NaF-K2NbF7 at temperatures between 850 and 1050 degrees C. In both cases only TaNi3 and NbNi3 stable phases are detected in the bulk of the layer. The intermetallic compounds of Ta-Ni binary system, including Ta2Ni, TaNi, TaNi2, and TaNi3 have been identified and the Gibbs energy of formation of Ta-Ni compounds have been calculated. It is shown that the growth of the surface alloying layer follows a parabolic law versus the alloying time. The kinetic parameters of the intermetallic diffusion of Ta-Ni and Nb-Ni systems, including the dimensionless parameters which depends on the solid compositions at the boundary of the alloy layer and the intermetallic diffusion coefficients D have been estimated by combination of electrochemical measurements and diffusion equation. The following equations are confirmed: x2=Kt and a=(K/D)1/2 where x is the thickness of the surface layer and K is the constant.
CC A8160B Metals and alloys
CT DIFFUSION IN SOLIDS; NICKEL; NICKEL ALLOYS; NIOBIUM ALLOYS; SURFACE TREATMENT; TANTALUM ALLOYS
ST electrochemical surface alloying; intermetallic compounds; Gibbs energy of formation; surface alloying layer; intermetallic diffusion; 850 to 1050 degC; Ta-Ni; Nb-Ni; Ni surface; **LiF-NaF-K2TaF7**; LiF-NaF-K2NbF7
CHI TaNi bin, Ni bin, Ta bin; NbNi bin, Nb bin, Ni bin; Ni sur, Ni el; LiFNaFK2TaF7 ss, F7 ss, K2 ss, Li ss, Na ss, Ta ss, F ss, K ss; LiFNaFK2NbF7 ss, F7 ss, K2 ss, Li ss, Na ss, Nb ss, F ss, K ss
PHP temperature 1.12E+03 to 1.32E+03 K
ET Ni; Ta; Nb; Ni*Ta; Ni sy 2; sy 2; Ta sy 2; Ta-Ni; Nb*Ni; Nb sy 2; Nb-Ni; F*K*Li*Na*Ta; F sy 5; sy 5; K sy 5; Li sy 5; Na sy 5; Ta sy 5; LiF; Li cp; cp; F cp; NaF; Na cp; K2TaF7; K cp; Ta cp; LiF-NaF-K2TaF7; F*K*Li*Na*Nb; Nb sy 5; K2NbF7; Nb cp; LiF-NaF-K2NbF7; C; TaNi3; Ni cp; NbNi3; Ta2Ni; TaNi; TaNi2; D; K; NbNi; LiFNaFK2TaF; F; Li; Na; LiFNaFK2NbF

L63 ANSWER 6 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1987:2972822 INSPEC DN A87119407
TI Formation of corrosion-resistant layers by electrodeposition of refractory metals or by alloy electrowinning in molten fluorides.
AU Taxil, P.; Mahenc, J. (Lab. de Chimie Phys. et d'Electrochimie, Univ. Paul Sabatier, Toulouse, France)
SO Journal of Applied Electrochemistry (March 1987) vol.17, no.2, p.261-9. 26 refs.
Price: CCCC 0021-891X/87/$03.00+.12
CODEN: JAELBJ ISSN: 0021-891X
DT Journal
TC Experimental

CY United Kingdom
LA English
AB The electrolytic treatment of less resistant metals such as iron, copper and nickel with tantalum or niobium has been carried out in **K2TaF7** -LiF-NaF or K2NbF7-LiF-NaF solutions in the 550 to 1050 degrees C temperature range. At lower temperatures, electroplating with **pure** tantalum and niobium on inert cathodes was performed. The electrodeposition mechanism of each metal was studied and coherent electroplates were tested in electrocatalytic applications. At higher temperatures (850-1050 degrees C), using nickel cathodes, intermetallic compounds were obtained at more positive potentials than that for **pure** electrodeposition (Ta2Ni, TaNi, TaNi2, TaNi3, NbNi, NbNi3). The electrowinning of stable TaNi3 and NbNi3 layers was carried out by the metalliding process which makes these materials resistant to corrosion in various media. A study of the kinetics of growth of the diffusion layer allowed a diffusion parameter to be determined in agreement with other results obtained by conventional methods.
CC A8115L Deposition from liquid phases (melts and solutions); A8120L Ceramics and refractories; A8160B Metals and alloys
CT CORROSION PROTECTIVE COATINGS; ELECTROPLATING; NICKEL ALLOYS; NIOBIUM; NIOBIUM ALLOYS; TANTALUM; TANTALUM ALLOYS
ST corrosion-resistant layers; electrodeposition of refractory metals; alloy electrowinning; inert cathodes; electrodeposition mechanism; coherent electroplates; intermetallic compounds; metalliding process; kinetics of growth; diffusion parameter; 550 to 1050 degC; **K2TaF7-LiF-NaF**; K2NbF7-LiF-NaF; Ta2Ni; TaNi; TaNi2; NbNi; TaNi3; NbNi3; Ni cathodes; Ta; Nb
CHI Ni sur, Ni el; Ta el; Nb el; K2TaF7LiFNaF ss, F7 ss, K2 ss, Li ss, Na ss, Ta ss, F ss, K ss; K2NbF7LiFNaF ss, F7 ss, K2 ss, Li ss, Na ss, Nb ss, F ss, K ss; Ta2Ni bin, Ta2 bin, Ni bin, Ta bin; TaNi bin, Ni bin, Ta bin; TaNi2 bin, Ni2 bin, Ni bin, Ta bin; NbNi bin, Nb bin, Ni bin; TaNi3 bin, Ni3 bin, Ni bin, Ta bin; NbNi3 bin, Ni3 bin, Nb bin, Ni bin
PHP temperature 8.23E+02 to 1.32E+03 K
ET F*K*Li*Na*Ta; F sy 5; sy 5; K sy 5; Li sy 5; Na sy 5; Ta sy 5; K2TaF7; K cp; cp; Ta cp; F cp; LiF; Li cp; NaF; Na cp; K2TaF7-LiF-NaF; F*K*Li*Na*Nb; Nb sy 5; K2NbF7; Nb cp; K2NbF7-LiF-NaF; C; Ni*Ta; Ni sy 2; sy 2; Ta sy 2; Ta2Ni; Ni cp; TaNi; TaNi2; TaNi3; Nb*Ni; Nb sy 2; NbNi; NbNi3; Ni; Ta; Nb; K2TaF7LiFNaF; F; K; Li; Na; K2NbF7LiFNaF

L63 ANSWER 7 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1987:2915709 INSPEC DN A87083894
TI Structure of luminescence of **K2TaF7** and K2NbF7.
AU Torardi, C.C.; Brixner, L.H. (Central Res. & Dev. Dept., E.I. du Pont de Nemours & Co., Wilmington, DE, USA); Blasse, G.
SO Journal of Solid State Chemistry (March 1987) vol.67, no.1, p.21-5. 13 refs.
Price: CCCC 0022-4596/87/$3.00
CODEN: JSSCBI ISSN: 0022-4596
DT Journal
TC Experimental
CY United States
LA English
AB The crystal structure of **K2TaF7** has been refined using single-crystal X-ray diffraction data. It is monoclinic with lattice parameters a=5.8559(6), b=12.708(1), and c=8.5125(9) AA and beta =90.17 degrees in the space group P21/c. The structure is composed of TaF7 units that are interconnected by potassium ions. TaF7 polyhedra may be described as monocapped trigonal prisms with the capping atom located on one of the rectangular faces. Potassium atoms are 9-coordinated and may be viewed as distorted monocapped square prisms. The previously unreported luminescence

properties of **K2TaF7** and K2NbF7 are reported and discussed. In addition to the intrinsic emission, impurity luminescence due to OH- and Eu2+ were observed.
CC A6160 Specific structure of inorganic compounds; A7855H Other inorganic materials
CT CRYSTAL ATOMIC STRUCTURE OF INORGANIC COMPOUNDS; LUMINESCENCE OF INORGANIC SOLIDS; NIOBIUM COMPOUNDS; PHOTOLUMINESCENCE; POTASSIUM COMPOUNDS; TANTALUM COMPOUNDS
ST luminescence; crystal structure; single-crystal X-ray diffraction data; space group; intrinsic emission; impurity luminescence; **K2TaF7**; K2NbF7
CHI K2TaF7 ss, F7 ss, K2 ss, Ta ss, F ss, K ss; K2NbF7 ss, F7 ss, K2 ss, Nb ss, F ss, K ss
ET F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; F*K*Nb; Nb sy 3; K2NbF7; Nb cp; P; F*Ta; TaF7; H*O; OH; OH-; O cp; H cp; OH in 1; in 1; Eu; Eu2+; Eu ip 2; ip 2; K2TaF; F; K; Ta; K2NbF; Nb

L63 ANSWER 8 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1987:2891609 INSPEC DN A87070666
TI Structural transformations in KNbF6 and **KTaF6**.
AU Gabuda, S.P.; Kozlova, S.G.; Kriger, Yu.G.; Goncharuk, V.K. (Inst. of Inorg. Chem., Acad. of Sci., USSR)
SO Journal of Structural Chemistry (March-April 1986) vol.27, no.2, p.221-4. 5 refs.
Price: CCCC 0022-4766/86/2702-0221$12.50
CODEN: JSTCAM ISSN: 0022-4766
Translation of: Zhurnal Strukturnoi Khimii (March-April 1986) vol.27, no.2, p.53-7. 5 refs.
CODEN: ZSTKAI ISSN: 0044-4634
DT Journal; Translation Abstracted
TC Experimental
CY USSR; United States
LA English
AB Low-temperature phase transitions in KNbF6 and **KTaF6** were detected by the NMR relaxation method on 19F nuclei. The probable mechanism of the phase transitions may be related to the rotation of polyhedra-the octahedral NbF6- and TaF6- anions. A characteristic feature of the crystals studied is their tendency to undergo a strong supercooling with the formation of several phases, which are stable for a prolonged time (more than 10 h). Data were obtained confirming that some of the supercooled phases can be considered disproportional.
CC A6470K Solid-solid transitions; A7660E Relaxation effects
CT CRYSTAL ATOMIC STRUCTURE OF INORGANIC COMPOUNDS; NUCLEAR MAGNETIC RESONANCE; POTASSIUM COMPOUNDS; SOLID-STATE PHASE TRANSFORMATIONS
ST structural transformations; phase transitions; NMR relaxation method; supercooling; KNbF6; **KTaF6**
CHI KNbF6 ss, F6 ss, Nb ss, F ss, K ss; KTaF6 ss, F6 ss, Ta ss, F ss, K ss
ET F*K*Nb; F sy 3; sy 3; K sy 3; Nb sy 3; KNbF6; K cp; cp; Nb cp; F cp; F*K*Ta; Ta sy 3; KTaF6; Ta cp; F; 19F; is; F is; F*Nb; NbF6; NbF6-; NbF6 in 1; in 1; F*Ta; TaF6; TaF6-; TaF6 in 1; KNbF; Nb; KTaF; Ta

L63 ANSWER 9 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1987:2819383 INSPEC DN A87027191
TI Electrodeposition of tantalum silicide coatings from molten salts.
AU Stern, K.H.; Williams, C.E. (Div. of Chem., Naval Res. Lab., Washington, DC, USA)
SO Journal of the Electrochemical Society (Oct. 1986) vol.133, no.10, p.2157-60. 14 refs.
CODEN: JESOAN ISSN: 0013-4651
DT Journal

TC Experimental
CY United States
LA English
AB Dense, adherent coatings of tantalum silicide have been plated from the (Li, Na, K)F eutectic containing several percent of each of **K2TaF7** and K2SiF6 on nickel substrates at 750 degrees C. The compositions and surface morphology of the coatings were studied as a function of melt composition and applied voltage between the nickel cathode and platinum quasi-reference electrode. Coatings were stable in air up to 600 degrees C, and their hardness is 1200 kg mm-2.
CC A6220M Fatigue, brittleness, fracture, and cracks; A6855 Thin film growth, structure, and epitaxy; A8115L Deposition from liquid phases (melts and solutions); A8245 Electrochemistry and electrophoresis
CT ELECTRODEPOSITS; HARDNESS; TANTALUM COMPOUNDS; X-RAY DIFFRACTION EXAMINATION OF MATERIALS
ST electrodeposition; melt composition dependence; applied voltage dependence; X-ray diffraction; adherent coatings; surface morphology; hardness; Ni substrates; LiF-NaF-KF eutectic melt; TaxSi coatings
CHI Ni sur, Ni el; LiFNaFKF ss, Li ss, Na ss, F ss, K ss; TaSi bin, Si bin, Ta bin
ET Li; Na; K; F; F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; F*K*Si; Si sy 3; K2SiF6; Si cp; C; Ni; F*K*Li*Na; F sy 4; sy 4; K sy 4; Li sy 4; Na sy 4; LiF; Li cp; NaF; Na cp; KF; LiF-NaF-KF; Si*Ta; Si sy 2; sy 2; Ta sy 2; TaxSi; LiFNaFKF; TaSi; Si; Ta

L63 ANSWER 10 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1985:2368316 INSPEC DN A85013033
TI Influence of temperature on IR spectra of fluoride complexes of Group IV and V elements.
AU Agulyanskii, A.I.; Zalkind, O.A.; Masloboev, V.A.
SO Journal of Applied Spectroscopy (Dec. 1983) vol.39, no.6, p.1408-11. 9 refs.
Price: CCCC 0021-9037/83/3906-1408$07.50
CODEN: JASYAP ISSN: 0021-9037
Translation of: Zhurnal Prikladnoi Spektroskopii (Dec. 1983) vol.39, no.6, p.960-4. 9 refs.
CODEN: ZPSBAX ISSN: 0514-7506
DT Journal; Translation Abstracted
TC Experimental
CY Byelorussian SSR; USSR; United States
LA English
AB The phenomenon of temperature dependence of vibrational spectra of substances in the condensed state is determined primarily by interparticle interactions. An increase in temperature, within the limits of stability of a given structural modification of the crystal, in the general case may lead to a smooth change in all three parameters of the bands in the vibrational spectrum: frequency, half-width, and intensity. Whereas the temperature dependence of the frequency is usually related to changes in the lengths and corresponding force constants of the bonds, and the temperature dependence of the half-width to changes in the parameters of Brownian rotational motion of the particles, the temperature dependence of the IR spectral band intensity is not subject to any such unambiguous interpretation. The authors attempt to interpret qualitatively the temperature dependence of the IR spectra of certain complex fluorides of group IV and V elements.
CC A7830G Infrared and Raman spectra in inorganic crystals
CT FLUORINE COMPOUNDS; INFRARED SPECTRA OF INORGANIC SOLIDS; TRANSITION METAL COMPOUNDS
ST solid state; condensed matter; K2SiF6; K2GeF6; Group IV elements; K2ZrF6; K2HfF6; **K2TaF7**; Group V elements; IR spectra; temperature

dependence; vibrational spectra; interparticle interactions; structural modification; frequency; half-width; intensity; Brownian rotational motion; complex fluorides
ET V; F*K*Si; F sy 3; sy 3; K sy 3; Si sy 3; K2SiF6; K cp; cp; Si cp; F cp; F*Ge*K; Ge sy 3; K2GeF6; Ge cp; F*K*Zr; Zr sy 3; K2ZrF6; Zr cp; F*Hf*K; Hf sy 3; K2HfF6; Hf cp; F*K*Ta; Ta sy 3; K2TaF7; Ta cp

L63 ANSWER 11 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1983:2058366 INSPEC DN A83062290
TI Electrodeposition of tantalum carbide coatings from molten salts.
AU Stern, K.H.; Gadomski, S.T. (Chem. Div., Naval Res. Lab., Washington, DC, USA)
SO Journal of the Electrochemical Society (Feb. 1983) vol.130, no.2, p.300-5. 11 refs.
CODEN: JESOAN ISSN: 0013-4651
DT Journal
TC Experimental
CY United States
LA English
AB Adherent tantalum carbide coatings have been **deposited** on nickel substrates from a ternary (Li,Na,K)F eutectic containing a few percent each of **K2TaF7** and K2CO3. Tantalum and carbon are **deposited** simultaneously on the nickel cathode where they react to form the carbide at 750 degrees -800 degrees . The coatings are highly resistant to abrasion and are thermally stable to approximately 600 degrees .
CC A6220P Tribology; A6855 Thin film growth, structure, and epitaxy; A8115L Deposition from liquid phases (melts and solutions)
CT ELECTRODEPOSITION; TANTALUM COMPOUNDS; WEAR RESISTANT COATINGS
ST abrasion resistance; TaC coatings; Ni substrate; electrodeposition; molten salts; thermally stable
ET Li; Na; K; F; F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; C*K*O; K2CO3; C cp; O cp; C*Ta; TaC; Ni

L63 ANSWER 12 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1983:2039681 INSPEC DN A83047635
TI An X-ray, NMR, infrared and Raman study of **K2TaF7**.
AU English, R.B.; Heyns, A.M. (Dept. of Chem., Univ. of South Africa, Pretoria, South Africa); Reynhardt, E.C.
SO Journal of Physics C (Solid State Physics) (20 Feb. 1983) vol.16, no.5, p.829-40. 16 refs.
Price: CCCC 0022-3719/83/050829+12$02.25
CODEN: JPSOAW ISSN: 0022-3719
DT Journal
TC Experimental
CY United Kingdom
LA English
AB The full infrared and Raman spectra of **K2TaF7** are reported and it is shown that although an unambiguous assignment of all the bands is not possible the results at ambient cannot be interpreted in terms of a rigid, distorted monocapped trigonal prism. At lower temperatures the vibrational spectra are characteristics of a rigid structure of low symmetry. These results are supported by NMR measurements showing that the anions are stationary on the NMR timescale below approximately 150K but that they execute reorientations which can only be visualised in terms of a nonrigid molecule at higher temperatures.
CC A6160 Specific structure of inorganic compounds; A7660 Nuclear magnetic resonance and relaxation; A7830G Infrared and Raman spectra in inorganic crystals
CT CRYSTAL ATOMIC STRUCTURE OF INORGANIC COMPOUNDS; INFRARED SPECTRA OF

INORGANIC SOLIDS; NUCLEAR MAGNETIC RESONANCE; POTASSIUM COMPOUNDS; RAMAN SPECTRA OF INORGANIC SOLIDS; TANTALUM COMPOUNDS
ST X-ray spectra; IR spectra; crystal structure; NMR; **K2TaF7**; Raman spectra; vibrational spectra
ET F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; K

L63 ANSWER 13 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1982:1892652 INSPEC DN A82077510
TI The vibrational spectra of crystals of **K2TaF7**.
AU Heyns, A.M. (Dept. of Chem., Univ. of South Africa, Pretoria, South Africa)
SO Journal of Molecular Structure (March 1982) vol.79, p.391-4. 11 refs.
CODEN: JMOSB4 ISSN: 0022-2860
Conference: 15th European Congress on Molecular Spectroscopy. Norwich, UK, 7-11 Sept 1981
Sponsor(s): Royal Soc.; Assoc. British Spectrosc
DT Conference Article; Journal
TC Experimental
CY Netherlands
LA English
AB The (TaF7)2--ion exhibits no symmetry in the monoclinic **K2TaF7** crystal but it nevertheless closely resembles the geometry of a monocapped trigonal prism of C2v-symmetry. The vibrational spectra of **K2TaF7** at ambient temperature are not in agreement with a low symmetry for the anions in the crystals and resemble the spectra of seven-coordinated species which are known to have a pentagonal bipyramidal structure of D5h-symmetry. It is shown that non-rigid behaviour of the (TaF7)2- groups give rise to this discrepancy. Below approximately 150K a large number of additional bands appear in the spectra and it can be concluded that when the crystal becomes rigid its equilibrium structure is reflected in the vibrational spectra. Neglect of the effects of non-rigid behaviour can therefore lead to serious misconceptions as far as the interpretation of the vibrational spectra of hepta-coordinate salts is concerned.
CC A6320 Phonons and vibrations in crystal lattices; A7830G Infrared and Raman spectra in inorganic crystals
CT LATTICE DYNAMICS; POTASSIUM COMPOUNDS; RAMAN SPECTRA OF INORGANIC SOLIDS
ST Raman spectra; monoclinic crystal; vibrational spectra; **K2TaF7**; monocapped trigonal prism; C2v-symmetry; pentagonal bipyramidal structure; D5h-symmetry; equilibrium structure
ET F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; F*Ta; (TaF7); (TaF7)2-; (TaF7) in 2; in 2; K

L63 ANSWER 14 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1982:1794350 INSPEC DN A82013351
TI NMR study of molecular motions and disorder in K3ZrF7 and **K2TaF7**
AU Reynhardt, E.C.; Pratt, J.C.; Watton, A.; Petch, H.E. (Dept. of Phys., Univ. of Victoria, Victoria, BC, Canada)
SO Journal of Physics C (Solid State Physics) (10 Nov. 1981) vol.14, no.31, p.4701-15. 10 refs.
CODEN: JPSOAW ISSN: 0022-3719
DT Journal
TC Experimental
CY United Kingdom
LA English
AB Fluorine second moments and spin-lattice relaxation times in the laboratory and rotating frames were measured as a function of temperature. The results show that the low-temperature orthorhombic structure of K3ZrF7 is disordered. Each of the four non-equivalent ZrF73- molecules has four possible orientations which can be described as twofold reorientations

about the crystallographic axes. The activation energies associated with these motions range from 6.3 to 10.0 kcal mol-1. In the high-temperature cubic phase the ZrF73- molecules are equivalent. The molecule has sixteen possible orientations but the results show that an additional reorientational mechanism results in an isotropic reorientation in which each F-F vector occupies all other F-F positions in the course of time. Due to the cross-relaxation between 91Zr and 19F nuclei, the quadrupolar relaxation time of 91Zr could be obtained from the T1 results. Although the TaF72- molecules has no symmetry axis, the relaxation results show clearly that it is involved in a two-stage reorientation mechanism. These reorientations are described as 'floppy' reorientations in which the shape of the molecule changes during each jump.

CC A6150 Crystalline state; A7660 Nuclear magnetic resonance and relaxation
CT NUCLEAR MAGNETIC RESONANCE; NUCLEAR SPIN-LATTICE RELAXATION; POTASSIUM COMPOUNDS; TANTALUM COMPOUNDS; ZIRCONIUM COMPOUNDS
ST NMR; molecular motions; disorder; K3ZrF7; **K2TaF7**; spin-lattice relaxation times; orthorhombic structure; twofold reorientations; F-F vector; cross-relaxation; 91Zr; 19F nuclei; quadrupolar relaxation time; TaF72- molecules; two-stage reorientation mechanism
ET F*K*Zr; F sy 3; sy 3; K sy 3; Zr sy 3; K3ZrF7; K cp; cp; Zr cp; F cp; F*K*Ta; Ta sy 3; K2TaF7; Ta cp; F*Zr; ZrF7; ZrF73-; ZrF7 in 3; in 3; F-F; Zr; 91Zr; is; Zr is; F; 19F; F is; F*Ta; TaF7; TaF72-; TaF7 in 2; in 2

L63 ANSWER 15 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1980:1455562 INSPEC DN A80016233
TI Effect of electrolyte composition and process parameters on the particle-size distribution of cathodic tantalum **deposits**.
AU Konstantinov, V.I.; Karpenko, O.A. (Inst. of Chem. & Technol. of Rare Elements & Mineral Raw Materials, Acad. of Sci., Kola, USSR)
SO Soviet Powder Metallurgy and Metal Ceramics (Sept. 1978) vol.17, no.9, p.655-9. 12 refs.
CODEN: SPMCAV ISSN: 0038-5735
Translation of: Poroshkovaya Metallurgiya (Sept. 1978) vol.17, no.9, p.1-6. 12 refs.
CODEN: PMANAI ISSN: 0032-4795
DT Journal; Translation Abstracted
TC Experimental
CY Ukrainian SSR; USSR; United States
LA English
AB Increasing the **K2TaF7** concentration in an oxyfluoride-chloride electrolyte results in tantalum being **deposited** in the form of powder consisting of spheroidal particles and increases the powder particle size. The coarsest electrolytic tantalum powder, composed of multiple spheroids, is obtained at a KCl/KF weight ratio in the bath equal to 1/1, while the finest powder is obtained from dendritic **deposits** forming during the electrolysis of **K2TaF7** -KCl-Ta2O5 and **K2TaF7**-KF-Ta2O5 melts. The particle size of electrolytic tantalum powder can be decreased by raising the melt temperature or increasing the cathodic current density.
CC A8120E Powder techniques, compaction and sintering; A8120G Specific metals and alloys (compacts, pseudoalloys)
CT ELECTRODEPOSITION; PARTICLE SIZE; POWDER METALLURGY; TANTALUM
ST electrolyte composition; process parameters; **K2TaF7 concentration** ; spheroidal particles; powder particle size; **dendritic deposits** ; electrolysis; **K2TaF7-KCl-Ta2O5**; **K2TaF7-KF-Ta2O5**; melt temperature; cathodic current density; particle size distribution; **cathodic deposits**; oxyfluoride chloride electrolyte
ET F*K*Ta; F sy 3; sy 3; K sy 3; Ta sy 3; K2TaF7; K cp; cp; Ta cp; F cp; Cl*K; KCl; Cl cp; F*K; KF; Cl*F*K*O*Ta; Cl sy 5; sy 5; F sy 5; K sy 5; O sy 5; Ta sy 5; Ta2O5; O cp; K2TaF7-KCl-Ta2O5; F*K*O*Ta; F sy 4; sy 4; K sy

4; O sy 4; Ta sy 4; K2TaF7-KF-Ta2O5

L63 ANSWER 16 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1976:917939 INSPEC DN A76053076
TI The crystal structure of potassium pentafluoroperoxotantalate(V)-potassium hydrogen difluoride, **K2(Ta(O2)F5)**. KHF2.
AU Ruzic-Toros, Z.; Kojic-Prodic, B. (Inst. Ruder Boskovic, Zagreb, Yugoslavia); Sljukic, M.
SO Acta Crystallographica, Section B (Structural Crystallography and Crystal Chemistry) (15 April 1976) vol.B32, pt.4, p.1096-8. 5 refs.
CODEN: ACBCAR ISSN: 0567-7408
DT Journal
TC Experimental
CY Denmark
LA English
AB Crystals of **K2(Ta(O2)F5)**.KHF2 are orthorhombic, space group Pna21 with a=6.999, b=13.848, c=9.094 AA, Z=4. The compound is sensitive to air and X-rays. The structure was determined from film data by Patterson and Fourier methods and refined by full-matrix least-squares to R=0.095. The structure is composed of discrete (Ta(O2)F5)2-, HF2- and K+ ions. Ta-F distances range from 1.88 (6) to 1.95 (4) AA. Ta-O distances are 2.02 (9) and 2.05 (14) AA. The O-O length in the peroxo group is 1.64 (16) AA. F...F in the HF2- ion is 2.25 (7) AA.
CC A6160 Specific structure of inorganic compounds
CT CRYSTAL ATOMIC STRUCTURE OF INORGANIC COMPOUNDS; POTASSIUM COMPOUNDS
ST crystal structure; **K2(Ta(O2)F5)**. **KHF2**; orthorhombic; space group; film data; Fourier methods; full matrix least squares refinement; Patterson method; lattice parameters
ET F*K*O*Ta; F sy 4; sy 4; K sy 4; O sy 4; Ta sy 4; K2(Ta(O2)F5); K cp; cp; Ta cp; O cp; F cp; F*H*K; KHF2; H cp; F*H; HF2; HF2-; HF2 in 1; in 1; K; K+; F*Ta; Ta-F; O*Ta; Ta-O; O-O; F

L63 ANSWER 17 OF 17 INSPEC COPYRIGHT 2002 IEE
AN 1976:905859 INSPEC DN A76045799
TI Polymorphism, high-pressure phase diagram and vibrational spectra of KSbF6.
AU Heyns, A.M. (Dept. of Phys. Chem., Univ. of South Africa, Pretoria, South Africa); Pistorius, C.W.F.T.
SO Spectrochimica Acta, Part A (Molecular Spectroscopy) (1976) vol.32A, no.3, p.535-45. 17 refs.
CODEN: SAMCAS ISSN: 0584-8539
DT Journal
TC Experimental
CY United Kingdom
LA English
AB KSbF6 I, stable above approximately 16 degrees C, is tetragonal, space group probably P42/mcm, with a0,c0=5.147 10.059 AA. Low-temperature KSbF6II is cubic, space group probably I23-T3 or I21/3-T5 with a0=10.176 AA. Both phases are ordered. The phase diagram of KSbF6 was determined to 7 kbar and 150 degrees C, and reveals the appearance of a denser polymorph KSbF6 III above the IIIIII triple point at 3.2 kbar, 14 degrees C. KSbF6 III can be expected to be rhombohedral, space group R3-c3i2. Infrared and Raman spectra of polycrystalline KSbF6 were studied in detail in the range 35 degrees C to -190 degrees C, and these data used to deduce the probable space groups of KSbF6 for phases I and II. The formerly accepted space groups of tetragonal and cubic KNbF6 and **KTaF6** and cubic AgSbF6 are incorrect. KSb(OH)6 is cubic, space group probably Pn3m-Oh4, with a0=8.125 AA.
CC A6160 Specific structure of inorganic compounds; A6470 Phase equilibria, phase transitions, and critical points; A7830G Infrared and Raman spectra

in inorganic crystals; A8130D Phase diagrams of other materials
CT CRYSTAL ATOMIC STRUCTURE OF INORGANIC COMPOUNDS; HIGH-PRESSURE EFFECTS IN SOLIDS; INFRARED SPECTRA OF INORGANIC SOLIDS; PHASE DIAGRAMS; POLYMORPHISM; POTASSIUM COMPOUNDS; RAMAN SPECTRA OF INORGANIC SUBSTANCES
ST vibrational spectra; KSbF6; space group; 7 kbar; 3.2 kbar; Raman spectra; polymorphism; 150 degrees C; high pressure phase diagram; IR spectra; 35 to minus 190 degrees C
ET F*K*Sb; F sy 3; sy 3; K sy 3; Sb sy 3; KSbF6; K cp; cp; Sb cp; F cp; I; C; P; F*I*K*Sb; F sy 4; sy 4; I sy 4; K sy 4; Sb sy 4; KSbF6II; I cp; F*K*Nb; Nb sy 3; KNbF6; Nb cp; F*K*Ta; Ta sy 3; KTaF6; Ta cp; Ag*F*Sb; Ag sy 3; AgSbF6; Ag cp; H*K*O*Sb; H sy 4; O sy 4; KSb(OH)6; O cp; H cp

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L77 ANSWER 1 OF 20 METADEX COPYRIGHT 2002 CSA
AN 2002(1):58-41 METADEX
TI Retardation of Ta silicidation by bias sputtering in Cu/Ta/Si(111) thin films.
AU Moshfegh, A.Z. (Sharif University of Technology); Akhavan, O. (Sharif University of Technology)
SO Journal of Physics D, Applied Physics (21 July 2001) 34, (14), 2103-2108, Spectra, Photomicrographs, Graphs, Numerical Data, 28 ref.
ISSN: 0022-3727
DT Journal
CY United Kingdom
LA English
AB In this investigation, we have studied the effect of negative bias voltage on the properties of a sputtered Ta layer deposited at high Ar pressure (13.3 Pa) which is used as a diffusion barrier in a Cu/Ta/Si structure focusing on its silicidation process. According to Rutherford backscattering spectrometry, the Cu(85 nm)/Ta(100 nm, unbiased)/Si(111) structure was found to be stable up to 300 deg C in a N2 environment for 30 min. At a temperature of 450 deg C, TaSi2 was formed at the Ta/Si(111) interface, and the Ta diffusion barrier completely failed. By applying various negative bias voltages ranging from 0 to -150 V an optimum bias voltage of Vb= -50 V for the sputtered Ta layer was found from scanning electron microscopy and four-point-probe resistivity measurements. In addition, the normalized ion flux (n i), defined as the ratio of Ar+ ion flux to Ta flux, was determined to be 7.5 for optimum experimental conditions. As a result, the biased Ta layer was used as a diffusion barrier between Cu and Si; it showed a low resistivity of 99 mu Omega cm, a density of about 14.1 g cm -3 with a good surface morphology and a contribution of bcc-Ta phase structure of about 65%. The Cu(50 nm)/Ta(50 nm, biased)/Si(111) structure was demonstrated to be thermally stable under perfect conditions up to 500 deg C and TaSi2 formation in an N2 environment for 30 min was retarded up to 700 deg C.
CC 58 Metallic Coating
CT Journal Article; Silicon: Coating; Copper: Coatings; Metallizing; Surface pretreatments; Interlayers: Reactions (chemical); Diffusion barriers: Reactions (chemical); Tantalum: Reactions (chemical); Silicides: Reactions (chemical); Interface reactions; Reaction kinetics
ET Ta; Cu; Ar; N2; Si*Ta; Si sy 2; sy 2; Ta sy 2; TaSi2; Ta cp; cp; Si cp;

Ar+; Ar ip 1; ip 1; Si

L77 ANSWER 2 OF 20 METADEX COPYRIGHT 2002 CSA
AN 2001(7):58-920 METADEX
TI Effects of copper diffusion barrier on physical/electrical barrier properties and copper preferred orientation.
AU Liu, C.S. (Taiwan Semiconductor Manufacturing); Shue, S.L. (Taiwan Semiconductor Manufacturing); Yu, C.H. (Taiwan Semiconductor Manufacturing); Liang, M.S. (Taiwan Semiconductor Manufacturing)
SO Advanced Metallization Conference 1999 (AMC 1999) (2000), 265-269, Graphs, Photomicrographs, Numerical Data, 6 ref.
Materials Research Society. 506 Keystone Drive, Warrendale, PA 15086, USA
Conference: Advanced Metallization (AMC) Conference 1999 and the Advanced Metallization Conference-Asia (ADMETA) 1999, Orlando, FL and Tokyo, USA and Japan, 28-30 Sept. 1999 and 14-15 Oct. 1999
ISBN: 1-55899-539-0
DT Conference Article
CY United States
LA English
AB Ta-based Cu diffusion barrier properties were widely studied. Cu directly deposited on Ta barrier layer can obtain strongest (111)-textured Cu. However, Ta exhibited the poorest thermal stability compared with other Ta-based barrier scheme. TaN(30 nm)/Ta(5 nm) scheme was found to be better than Ta(5 nm)/TaN(30 nm) in terms of thermal stability because the grains of TaN directly deposited on Ta will grow with columnar structure and keep the same grain boundary diffusion path. Vacuum break between Cu and Ta-based diffusion barrier can improve the Cu thermal stability. However, vacuum break will degrade the growth (111)Cu preferred orientation.
CC 58 Metallic Coating
CT Conference Paper; Electronic devices: Coating; Copper: Coatings; Metallizing; Surface pretreatments
ET Ta; Cu; N*Ta; TaN; Ta cp; cp; N cp

L77 ANSWER 3 OF 20 METADEX COPYRIGHT 2002 CSA
AN 2001(1):12-41 METADEX
TI Nucleation of recrystallized grains in multiple slipped structure without deformation band in aluminum single crystal.
AU Kashihara, K. (Wakayama National College of Technology); Tagami, M. (Tokushima University); Okada, T. (Tokushima University); Inoko, F. (Tokushima University)
SO Materials Science and Engineering A (2000) 291, (1-2), 207-217, Photomicrographs, Numerical Data, 46 ref.
ISSN: 0921-5093
DT Journal
CY Switzerland
LA English
AB The characteristics of multiple slipped structure and the nucleation of recrystallized grains (RGs) have been investigated using pure aluminum single crystals with an initial tensile axis (TA) orientation of <111> deformed in tension. By a scanning electron microscope (SEM), very short and wavy slip traces without deformation bands (DBs) were observed, in which the maximum misorientation was only approx5 deg . By a transmission electron microscope (TEM), it is found that a layered dislocation microstructure consisted of cells with dense dislocation walls (DDWs) was developed. Groups of the cells were mutually rotated, by approx4 deg , about an axis normal to the TA as if they maintained tensile strain and compressive strain by turns. After annealing, orientations of RGs were mainly rotated at angles of >26 deg about each <111> axis normal to four kinds of {111} slip planes in each adjacent deformed matrix (DM). It is renewed in more detail that the nucleation of the RGs with the <111>

rotation relationship to each adjacent DM could be explained by the <111> rotation recrystallization (nucleation) model. The <111> rotation relationships between the deformation textures and the corresponding annealing textures in FCC metals are selected in both stages of the nucleation of RGs and their growth.
CC 12 Crystal Properties; 31 Mechanical Properties
CT Journal Article; Aluminum: Microstructure; Single crystals: Microstructure; Slip: Deformation effects; Dislocations: Deformation effects; Recrystallization: Deformation effects; Nucleation; Orientation relationships; Tension

L77 ANSWER 4 OF 20 METADEX COPYRIGHT 2002 CSA
AN 2000(11):58-1879 METADEX
TI Bias sputtered Ta modified diffusion barrier in Cu/Ta(Vb)/Si(111) structures.
AU Moshfegh, A.Z. (Sharif University of Technology); Akhavan, O. (Sharif University of Technology)
SO Thin Solid Films (17 July 2000) 370, (1-2), 10-17
ISSN: 0040-6090
DT Journal
CY Switzerland
LA English
AB In this investigation, we have fabricated Ta(Vb)/Si(111) and Cu /Ta(Vb)/Si(111) systems using a DC bias sputtering technique at high Ar pressure (100 mTorr). For Ta/Si(111) system, tantalum layer was formed under various bias voltages ranging from 0 to -150 V. The films were characterized by Rutherford backscattering spectrometry (RBS), scanning electron microscopy (SEM) and four-point probe sheet resistance measurements (R s). From electrical resistivity and SEM data, a minimum resistivity (99 mu Omega cm) and well surface morphology at an optimum bias voltage (Vb=-50 V) was obtained for the Ta(Vb)/Si(111) system. The Ta films deposited under these conditions with 50 nm thickness are then used as a diffusion barrier in the Cu/Ta(Vb)/Si(111) multilayer structure. According to our RBS, SEM and R s analysis, the Ta barrier layer formed under the controlled bias sputtering at high Ar pressure has demonstrated an improved Ta structure with excellent thermal stability up to 650 deg C for the Cu/Ta(Vb)/Si(111) system annealed in N2 environment for 30 min. Formation of TaSi2 was observed at 700 deg C after the barrier failure using RBS spectra.
CC 58 Metallic Coating
CT Journal Article; Copper: Coatings; Silicon: Coating; Diffusivity: Coating effects; Interlayers; Tantalum: Thin films; Sputtering; Thermal stability
ET Ta; Cu; Ar; N2; Si*Ta; Si sy 2; sy 2; Ta sy 2; TaSi2; Ta cp; cp; Si cp

L77 ANSWER 5 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1999(6):12-763 METADEX
TI PVD deposition and characterization of Cu/Si(111) and Cu/Ta/Si(111) multilayers.
AU Moshfegh, A.Z. (Sharif University of Technology); Shafiee, M.M. (Sharif University of Technology); Akhavan, O. (Sharif University of Technology)
SO 11th Congress of the International Federation for Heat Treatment and Surface Engineering and the 4th ASM Heat Treatment and Surface Engineering Conference in Europe Proceedings. Volume 2 (1998), 69-77, Graphs, Photomicrographs, 9 ref.
Associazione Italiana di Metallurgia. Piazzale Rodolfo Morandi, 2, Milano, I-20121, Italy
Conference: 11th Congress of the International Federation for Heat Treatment and Surface Engineering and the 4th ASM Heat Treatment and Surface Engineering Conference in Europe, Florence, Italy, 19-21 Oct. 1998
DT Conference Article

CY Italy
LA English
AB In this investigation, we have studied the fabrication and characterization of PVD deposited Cu/Si(111) and Cu/Ta/Si(111) multilayers by using direct current sputtering technique. The growth parameters are examined for the desired conditions. Discharge voltage for Cu and Ta was 1500 and 1700 V respectively. Rutherford backscattering spectrometry (RBS) was used to analyze diffusion, reaction and interfaces of Cu-Si, Cu-Ta, and Ta-Si. Scanning electron microscopy (SEM) was utilized to determine morphology and microstructure of the deposited Cu/Si(111) and Cu/Ta/Si(111) systems. It was found that by increasing the annealing temperature the grain size increased. At the 500 deg C, some of the grains exhibit dumbbell-like structure with average grain size of approx2 mu m. Electrical properties of the depositing systems were studied by using four point probe sheet resistance (R s) measurements. We have observed a sudden increase of R s from 300-400 deg C for the Cu/Ta/Si(111) multilayer structure.
CC 12 Crystal Properties
CT Conference Paper; Copper: Thin films; Tantalum: Thin films; Silicon: Thin films; Physical vapor deposition; Thin films: Microstructure; Grain size: Heating effects; Annealing
ET Cu; Ta; Cu*Si; Cu sy 2; sy 2; Si sy 2; Cu-Si; Cu*Ta; Ta sy 2; Cu-Ta; Si*Ta; Ta-Si

L77 ANSWER 6 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1997(10):31-4708 METADEX
TI Dwell sensitivity fatigue behavior of high temperature materials.
AU Goswami, T. (Wichita State University); Halford, G.R. (NASA Lewis Research Center); Hoeppner, D.W. (Wichita State University)
SO High Temperature Materials and Processes (1997) 16, (2), 87-96, Graphs, 15 ref.
ISSN: 0334-6455
DT Journal
CY United Kingdom
LA English
AB The dwell sensitivity fatigue behavior of six high temperature materials is examined in this paper: two stainless steels, 304L and 304, two tantalum alloys, T-111 and ASTAR 811C, pure nickel Ni 201 and a single crystal nickel-base superalloy, PWA 1480. The stainless steel alloys were found to be tensile dwell sensitive; however, a saturation in dwell sensitivity was found with the increase in strain range for all materials examined. At lower strain ranges the dwell cycles were producing lower lives than at higher strains, as found in the case of AISI SS 304 and two Ta based alloys, T-111 and ASTAR 811C. Trends in various normalized life curves were found to be strain dependent for ASTAR 811C, in which <0.2% inelastic strain range, dwell effects were more deleterious than above it. Mechanistic aspects under different test conditions were summarized.
CC 31 Mechanical Properties
CT Journal Article; Austenitic stainless steels: Mechanical properties; Tantalum base alloys: Mechanical properties; Tantalum base alloys: Mechanical properties; Superalloys: Mechanical properties; Nickel base alloys: Mechanical properties; Dwell time; Fatigue (materials); Tensile stress; Strain
ALI 304L CCA: SSA; 304 CCA: SSA; T-111 CCA: TA; 811C CCA: TA; PWA1480 CCA: NI; PWA1480 CCA: SP
ET C; Ni; Ta

L77 ANSWER 7 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1996(7):31-2626 METADEX
TI Dwell effects in isothermal and thermomechanical fatigue of advanced

materials.
AU Goswami, T. (University of Utah)
SO ISIJ International (1996) 36, (4), 461-466, 16 ref.
ISSN: 0915-1559
DT Journal
CY Japan
LA English
AB Effects of dwell times in the isothermal fatigue (IF) and thermal-mechanical fatigue (TMF) behaviors of six advanced high temperature materials are investigated in this paper; two of which belonged to Types SS304L and SS304 stainless steels, two tantalum alloys; T-111 and ASTAR 811C, pure nickel Ni 201 and a Ni based, single crystal superalloy PWA 1480. The SS304 and 304L steels were found to be sensitive under tensile dwells, however, effect of dwell times was found to saturate with the increase in strain range (inelastic or total) for all materials examined. At lower strain ranges the effects of dwell times were found to produce lower lives than at higher strains as in the case of AISI SS304 and two Ta based alloys T-111 and ASTAR 811C. Trends in various normalized life curves were found to be near sigmoidal for ASTAR 811C, in which a typical inflection point could be found at approx0.2% inelastic strain range. Effects of dwell-times were more deleterious below that strain range and >0.2% inelastic strain range the effects of dwell times were nearly the same. Mechanistic aspects under different test conditions were summarized.
CC 31 Mechanical Properties
CT Journal Article; Austenitic stainless steels: Mechanical properties; Tantalum base alloys: Mechanical properties; Nickel: Mechanical properties; Low cycle fatigue; Fatigue (materials); Nickel base alloys: Mechanical properties; Superalloys: Mechanical properties
ALI 304L CCA: SSA; 304 CCA: SSA; PWA1480 CCA: NI; PWA1480 CCA: SP
ET F*I; IF; I cp; cp; F cp; C; Ni; Ta

L77 ANSWER 8 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1996(3):34-201 METADEX
TI Surface segregation and chemisorption of carbon monoxide and oxygen on Pt25Ni75(111) studied by XPS and HREELS.
AU Goldmann, A. (Universitat Gesamthochschule Kassel); Pantforder, A. (Universitat Gesamthochschule Kassel); Skonieczny, J. (Universitat Gesamthochschule Kassel); Janssen, E. (Universitat Gesamthochschule Kassel); Meister, G. (Universitat Gesamthochschule Kassel); Varga, P. (Technische Universitat Wien)
SO Surface Science (1 July 1995) 331-333, (Part A), 824-830, Graphs, Spectra, 35 ref.
. The Netherlands
Conference: 14th European Conference on Surface Science, Leipzig, Germany, 19-23 Sept. 1994
ISSN: 0039-6028
DT Conference Article
CY Netherlands
LA English
AB After sputtering and annealing to different temperatures TA the chemically disordered (111) surface of a Pt25Ni75 crystal exhibits a composition that depends strongly on TA. This has been already observed earlier by ion scattering and scanning tunneling microscopy [M. Schmnid et al., Nucl. Instrum. Methods B 82(1993) 259]. To complement this work, we have used angle-resolved x-ray photoelectron spectroscopy (XPS) to investigate the segregation behavior a few layers below the surface. We have also used high-resolution electron energy loss spectroscopy (HREELS) to study adsorbate vibrations on differently prepared surfaces of Pt25Ni75(111) after exposure to O2 and CO at room temperature.

CC 34 Chemical and Electrochemical Properties
CT Conference Paper; Chemisorption; Segregations; Carbon monoxide: Sorption; Platinum compounds: Single crystals; Nickel compounds: Single crystals; Single crystals: Sorption; Vibration
ET Ni*Pt; Ni sy 2; sy 2; Pt sy 2; Pt25Ni75; Pt cp; cp; Ni cp; B; O2; C*O; CO; C cp; O cp

L77 ANSWER 9 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1996(1):31-191 METADEX
TI Brillouin light scattering investigation of the elastic properties of Ta/Al metallic superlattices.
AU Carlotti, G. (Universita di Perugia); Fioretto, D. (Universita di Perugia); Socino, G. (Universita di Perugia); Xia, H. (Nanjing University); Hu, A. (Nanjing University); Jiang, S.S. (Nanjing University)
SO Materials Research Society. 9800 McKnight Rd., Suite 327, Pittsburgh, PA 15237, USA. 1995. 385-390, Graphs, Spectra, 24 ref.
Conference: Thin Films: Stresses and Mechanical Properties V, Boston, MA, USA, 28 Nov.-2 Dec. 1994
ISBN: 1-55899-257-X
DT Conference Article
CY United States
LA English
AB The Brillouin light scattering technique has been exploited for investigating the elastic properties of periodic superlattices made by alternating layers of Ta and Al. These multilayers, deposited by d.c. sputtering on glass and Si substrates, present a polycrystalline structure with (110) and (111) texture for the Ta and Al layers, respectively. They have total thicknesses of approx0.5 mu m and periods ranging from 4-10 nm. Measurement of the phase velocities of the Rayleigh and Sezawa acoustic modes from the frequency position of the corresponding Brillouin peaks, yielded information on the effective elastic constants of the superlattices. For large periods (8-10 nm) the values determined experimentally are in good agreement with those calculated from the elastic constants of the bulk materials, while for lower periods (4-6 nm) the estimated elastic constants exhibit a marked increase. This anomalous behavior has been attributed to the presence of a transition layer at each interface, where Ta and Al interdiffuse, as observed by x-ray and electron microscopy experiments.
CC 31 Mechanical Properties
CT Conference Paper; Tantalum: Thin films; Aluminum: Thin films; Superlattices; Multilayers: Mechanical properties; Elastic constants; Brillouin zone; Interfaces: Diffusion
ET Ta; Al; Si

L77 ANSWER 10 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1995(9):41-222 METADEX
TI The study of interaction of tantalum(111,1V) with niobium(111,V) in the sulfuric acid solution by potentiometric method.
AU Ivanenko, V.I.; Kadyrova, G.I.
SO Zh. Neorg. Khim. (1992) 37, (4), 839-844, Graphs, 16 ref.
ISSN: 0044-457X
DT Journal
LA Russian
AB For the purpose of the study of behaviour of rare earth metals in processing mineral raw, the ion-ion interactions tantalum and niobium are considered. It is established that Ta111 and NbV, TaV and Nb111 are indifferent species to one another. Interaction NbV with TaV over a area of polynuclear metal form is detected in 1/6 mole/l sulfuric acid. The relationship is calculated for NbV:TaV in the heteronuclear complexes at various concentrations of sulfuric acid.

CC 41 Ores and Raw Materials
CT Journal Article; Niobium: Beneficiation; Tantalum: Beneficiation; Reactions (chemical): Environmental effects; Sulfuric acid: Environment; Complex compounds: Chemical analysis; Electrical measurements
ET V; Nb*Ta; Nb sy 2; sy 2; Ta sy 2; Nb:Ta; NbV:TaV; TaV doping; doped materials

L77 ANSWER 11 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1995(3):31-996 METADEX
TI The effects of texture and strain on the R-value of heavy gauge tantalum plate.
AU Michaluk, Ch. (Cabot); Bingert, J. (Los Alamos National Laboratory); Choi, C.S. (Ardec)
SO Mater. Sci. Forum (1994) 157-162, (2), 1653-1661, Graphs, Maps.$R22 ref
Accession Number: 19(95):3--2-00
Trans Tech Publications Ltd.. Trans Tech House, Hardstrasse 13, Aedermannsdorf, CH-4711, Switzerland
Conference: ICOTOM-10. 10th International Conference on Textures of Materials, Clausthal, Germany, 20-24 Sept. 1993
ISSN: 0255-5476
DT Conference Article; Journal
CY Switzerland
LA English
AB Previous work suggests that the r-value measured from thick-gauge Ta plate does not correspond to the predicted r-values calculated from ODF (orientation distribution function) coefficients. To understand this behavior bulk texture analysis using neutron diffraction techniques was conducted on annealed samples of Ta and Ta-2.5W plate: the pure Ta exhibited a primary {111(type texture, whereas the alloy contained a cube texture. For the pure Ta the r-values calculated from the texture of as-annealed and the deformed specimens were similar and correlated well with measured data. The r-value of the Ta-2.5W exhibited a greater amount of strain sensitivity, such that the calculated r-values based on the initial texture did not represent those calculated or measured after tensile deformation. The strain sensitivity of r-values in Ta and Ta-2.5W plates is shown to relate to the generation of a < 110 > fiber texture during deformation.
CC 31 Mechanical Properties
CT Conference Paper; Journal Article; Tantalum: Mechanical properties; Tantalum base alloys: Mechanical properties; Tungsten: Alloying elements; Formability: Deformation effects; Cube texture; Plastic deformation; Fibrous structure
ALI Ta-2.5W CCA: TA
ET Ta; Ta*W; Ta sy 2; sy 2; W sy 2; Ta-2.5W

L77 ANSWER 12 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1994(12):63-567 METADEX
TI Texture and Grain Size of Permalloy Thin Films Sputtered on Silicon With Chromium, Tantalum and SiO2 Buffer Layers.
AU Galtier, P. (Thomson-CSF); Jerome, R. (Thomson-CSF); Valet, T. (Thomson-CSF)
SO Materials Research Society. 9800 McKnight Rd.Suite 327, Pittsburgh, PA 15237, USA. 1994. 417-422, Photomicrographs, Diffraction Patterns.$R15 ref
Accession Number: 19(94):2--2-07
Conference: Polycrystalline Thin Films: Structure, Texture, Properties and Applications, San Francisco, California, USA, 4-8 Apr. 1994
DT Conference Article
CY United States
LA English
AB The structural properties of Ni80Fe20 thin films sputtered on silicon with

Cr, Ta and SiO2 buffer layers were investigated using transmission electron microscopy. A decrease of the grain size was observed when Ta and SiO2 underlayers are used instead of Cr. Permalloy films deposited on Ta layers are strongly (111) textured while those grown on Cr and SiO2 are mostly randomly oriented. The results are discussed with respect to the nanostructure of both Ta, Cr and SiO2 underlayers and in relation to the variation of the magnetic softness observed in this system.
CC 63 Electronic Devices
CT Conference Paper; Nickel base alloys: Thin films; Magnetic alloys: Thin films; Thin films: Microstructure; Sputtered films: Microstructure; Texture; Grain size; Silicon: Coating
ALI Ni80Fe20 CCA: NI; Permalloy CCA: NI
ET O*Si; SiO2; Si cp; cp; O cp; Fe*Ni; Fe sy 2; sy 2; Ni sy 2; Ni80Fe20; Ni cp; Fe cp; Cr; Ta

L77 ANSWER 13 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1992(11):21-337 METADEX
TI An Electron Diffraction and Microscopy Investigation of Quasi-Periodic Ta-Al Superlattices.
AU Jiang, S.S. (University of Sydney); Zhou, J. (University of Sydney); Cockayne, D.J.H. (University of Sydney); Sikorski, A. (University of Sydney); Hu, A. (Nanjing University); Peng, R.W. (Nanjing University)
SO Philosophical Magazine B (Aug. 1992) 66, (2), 229-237, Diffraction patterns, 12 ref.
ISSN: 0141-8637
DT Journal
CY United Kingdom
LA English
AB Quasi-periodic (Fibonacci sequence) Ta-Al multilayer films were fabricated by magnetron sputtering, and studied by electron and X-ray diffraction. Eleven orders of electron diffraction satellite spots were obtained. Their positions and intensities were in good agreement with the data from X-ray diffraction, and both were in excellent agreement with the theoretical positions predicted by the projection method, k = 2 pi D-1(n + m tau). Transmission electron microscope studies of the thin film cross-sections showed The well-formed layered structures of Fibonacci sequence Ta-Al superlattices. the films have textures with Ta[110] and Al[111] in the growth direction, and coherent stacking in the quasi-periodic multilayers.
CC 21 Metallography
CT Journal Article; Tantalum: Metallography; Aluminum: Metallography; Thin films: Metallography; Superlattices; X ray diffraction; Electron diffraction; Electron microscopy
ET Al*Ta; Al sy 2; sy 2; Ta sy 2; Ta-Al; Ta; Al

L77 ANSWER 14 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1992(2):34-160 METADEX
TI Study on Quasiperiodic Ta/Al Multilayer Films by X-Ray Diffraction.
AU Peng, R.W. (Nanjing University); Hu, A. (Nanjing University); Jiang, S.S. (Nanjing University)
SO Applied Physics Letters (11 Nov. 1991) 59, (20), 2512-2514, Diffraction patterns, 12 ref.
ISSN: 0003-6951
DT Journal
CY United States
LA English
AB Quasiperiodic (Fibonacci) Ta/Al multilayer films with Ta(110) and Al(111) textures were fabricated by magnetron sputtering. The structure of the multilayers was characterized in detail by X-ray diffraction. The diffraction peaks at low and high angles can be indexed by the projection method from the high-dimension periodic structure. The experimental

results were in good agreement with the numerical calculation using the model for the compositionally modulated multilayers. The diffraction spectrum of the quasiperiodic Ta/Al multilayers is totally different from that of periodic structure, and the possible application of Fibonacci films as optical elements in a soft X-ray region is discussed.
CC 34 Chemical and Electrochemical Properties
CT Journal Article; Tantalum: Thin films; Aluminum: Thin films; Multilayers: Synthesis; Texture; Sputtered films
ET Ta; Al

L77 ANSWER 15 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1990(2):12-144 METADEX
TI Growth and Electronic Structure of Niobium and Tantalum Films on Palladium and Their Interaction With Carbon Monoxide.
AU Jiang, L.Q.; Ruckman, M.W.; Strongin, M.
CS Brookhaven National Laboratory
SO J. Vac. Sci. Technol. A (May-June 1989) 7, (3-II), 2016-2019
Conference: 35th National Symposium of the American Vacuum Society. II, Atlanta, Georgia, USA, 2-7 Oct. 1988
ISSN: 0734-2101
DT Conference; Journal
LA English
AB The growth of Nb and Ta films on Pd(111) and their modification of carbon monoxide chemisorption are studied using ultraviolet photoelectron spectroscopy (UPS), low-energy electron diffraction, and low-energy ion scattering (LEIS). At 300K, LEIS shows significant amounts of Pd in the top layer even after more than a monolayer of Nb or Ta is deposited. This is in contrast to Pd on Nb or Ta(110) where a Pd monolayer completely covers the substrate. UPS shows that the surface electronic structure at monolayer Nb or Ta coverage resembles that of a Pd monolayer on Nb or Ta(110) and is characterized by strong Pd 4d emission 1-4 eV below E f and a low density of states at E f. Molecular CO adsorption is observed at submonolayer coverage; there is little CO adsorption at monolayer coverage and dissociative CO adsorption starts at greater than monolayer coverage. It is concluded that the deposited Nb or Ta monolayers intermix with the Pd(111) substrate and it is also shown that this behavior can be understood by examining the energetics of the system. , . 17 ref.-AA
CC 12 CRYSTAL PROPERTIES
CT Palladium: Coating; Niobium: Coatings; Tantalum: Coatings; Carbon monoxide: Sorption; Electronic structure; Vapor deposited coatings: Diffusion; Surface structure
ET Nb; Ta; Pd; K; C*O; CO; C cp; cp; O cp

L77 ANSWER 16 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1988(9):34-790 METADEX
TI Interfacial Reaction Between Tantalum Ultrathin Films and Si(111) Substrate.
AU Nguyen Tan, T.A.; Azizan, M.; Derrien, J.
CS CNRS
SO Surf. Sci. (Oct. 1987) 189-190, 339-345
Conference: ECOSS-9. Ninth European Conference on Surface Science, Luzern, Switzerland, 13-16 Apr. 1987
ISSN: 0039-6028
DT Conference; Journal
LA English
AB UPS, work-function and LEED results on the interfacial reaction between evaporated Ta and Si(111)(7 x 7) surface under ultrahigh vacuum conditions are reported. At room temperature, a disordered chemisorbed phase is formed at low coverage, theta <= 1 monolayer (ML), and is characterized by an UPS Ta 5d peak shifted at about -1.2 eV as compared to bulk Ta. For 1

<= theta <= 4 ML, although AES and XPS indicate a 1 Ta:2 Si composition, the valence band spectra are still different from the TaSi2 one. At higher coverage, the electronic structure of polycrystalline Ta is progressively recovered. Annealing of the deposits leads to silicide formation by interdiffusion and surface atomic ordering at temperatures from 650 to 850 deg C, depending on the thickness. All the deposits in the 0.8-100 ML range, including the smallest ones, are stable until approx 500 deg C and the silicide formation reaction begins only at higher temperature, reflecting an activation energy barrier. For theta <= 5 ML, clustering of the TaSi2 phase occurs. For thicker deposits, continuous TaSi2 overlayers are obtained. The electronic structure of this silicide is discussed in relation with existing models. 6 ref.-AA

CC 34 CHEMICAL AND ELECTROCHEMICAL PROPERTIES
CT Tantalum: Thin films; Silicon: Coating; Interface reactions; Silicides: Atomic properties; Band theory
ET Si; Ta; Si*Ta; Si sy 2; sy 2; Ta sy 2; TaSi2; Ta cp; cp; Si cp

L77 ANSWER 17 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1987(9):31-4032 METADEX
TI Creep Properties of Selected Refractory Alloys for Potential Space Nuclear Power Applications.
AU McCoy, H.E.
CS Oak Ridge National Laboratory
NR DE87002333/GAR (Oct. 1986) Pp 96
DT Report
LA English
AB Existing equipment and previous test techniques were requalified for conducting high-vacuum, high-temperature creep tests on refractory metals. The creep facilities were requalified on the basis of minimal interstitial pickup and reproducible creep results using Nb-1Zr and T-111 (Ta-8W-2Hf) specimens. After requalification was completed, tests were run on three lots of Nb-1Zr, one lot of PWC-11 (Nb-1Zr-0.1C) Mo alloys containing 9, 11, and 13% rhenium, and two lots of chemical vapor deposition tungsten (CVD-W). The creep strength of Nb-1Zr was equivalent to that reflected in previously correlated data. The lot of PWC-11 was thought to have been extruded at a lower-than-optimum temperature, so it was weaker. The duplex anneal used increased strength, slightly. The test results on the Mo-Re alloys were inconclusive because of the multiple stresses and temperatures used on each specimen. It was apparent that the Mo-9Re alloy was the weakest and that the Mo-11Re and Mo-13Re alloys, which had about equal properties, were the strongest. The work on CVD-W has just begun; the creep strength appears equivalent to that measured in previous tests under similar conditions.-GRAI

CC 31 MECHANICAL PROPERTIES
CT Niobium base alloys: Mechanical properties; Molybdenum base alloys: Mechanical properties; Creep strength; Tungsten: Mechanical properties; Propulsion systems: Materials selection
ALI PWC-11, Nb-1Zr CCA: NB; Mo-9Re, Mo-11Re, Mo-13Re CCA: MO
ET Nb*Zr; Nb sy 2; sy 2; Zr sy 2; Nb-1Zr; Hf*Ta*W; Hf sy 3; sy 3; Ta sy 3; W sy 3; Ta-8W-2Hf; C*Nb*Zr; C sy 3; Nb sy 3; Zr sy 3; Nb-1Zr-0.1C; Mo; W; Mo*Re; Mo sy 2; Re sy 2; Mo-Re; Mo-9Re; Mo-11Re; Mo-13Re

L77 ANSWER 18 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1987(3):52-441 METADEX
TI The Forming of Metal Components for Radioisotope Heat Sources. (Retroactive Coverage).
AU Johnson, E.W.
SO Orbit Book Company, Inc.. 2005 Township Rd., Malabar, Florida 32950, USA. 1985. 341-347. Accession Number: 87(3):72-156
Conference: Space Nuclear Power Systems 1984. Vol. 2, Albuquerque, New

Mexico, USA, 11-13 Jan. 1984
DT Conference
LA English
AB Use of refractory and noble metals to encapsulate the Pu-238 fuel used to power radioisotope thermoelectric generators (RTGs) presents a series of problems for the fabricator. These alloys (Ta-10W, T-111, Mo-Re, Pt-Rh, and Ir-0.3W) permit a high RTG operating temperature, which increases the efficiency, and minimizes the risk of releasing plutonium dioxide in an accident. The choice of materials for heat source construction has evolved from superalloys and refractory metal systems to Ir/C. Techniques employed at Monsanto Research Corporation (MRC) to develop flight-quality iridium clad vent sets (CVSs) to support production of the general purpose heat source (GPHS) are described. Techniques of forming, welding, and heat treating are addressed, as are the quality requirements necessary to justify employing the "DOP-26" Ir alloy parts as a primary encapsulation for 238PuO2 fuel. The methods employed have enabled MRC to meet the DOE-defined requirements to support the CVS requirements for the Galileo and International Solar-Polar Missions. 5 ref.-AA
CC 52 WORKING (FORMING)
CT Space probes; Thermoelectric power generation; Nuclear fuels; Radiation shielding: Fabrication; Tantalum base alloys: Metal working; Molybdenum base alloys: Metal working; Iridium base alloys: Metal working
ALI Ta-10W, T-111 CCA: TA; Ir-0.3W CCA: IR
ET Pu; Ta*W; Ta sy 2; sy 2; W sy 2; Ta-10W; Mo*Re; Mo sy 2; Re sy 2; Mo-Re; Pt*Rh; Pt sy 2; Rh sy 2; Pt-Rh; Ir*W; Ir sy 2; Ir-0.3W; Ir; O*Pu; PuO2; 238PuO2; is; Pu is; 238Pu; Pu cp; cp; O cp

L77 ANSWER 19 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1983(3):35-383 METADEX
TI AES Study of the Reaction of Oxygen With T-111 (Ta-8W-2Hf).
AU David, D.J.; Snide, J.A.; Moddeman, W.E.
SO Appl. Surf. Sci. (Sept.-Oct. 1982) 13, (3-4), 329-351
DT Journal
LA English
AB Reactions of oxygen with T-111, the kinetics of the reaction, the role of Hf and the rate-controlling step of such reactions at elevated temp. were evaluated using polished and etched specimens whose surfaces were monitored from optical and secondary electron images. Auger electron spectroscopy (AES) and Auger mapping were essential in obtaining a comprehensive assessment and understanding of the surface reactions and kinetics. Oxygen was found to preferentially associate with Hf. The concentrations of HfO2 decreased and that of Hf increased at elevated temp., indicating thermally activated transport of HfO2 into the bulk accompanied by Hf enrichment. The percent increase in surface enrichment, the activation energy and the surface tension of pure Hf were determined. A general theory regarding surface protection at elevated temp. is proposed. 25 ref.-AA
CC 35 CORROSION
CT Tantalum base alloys: Oxidation; Oxidation resistance: Alloying effects; Hafnium: Alloying elements; High temperature; Thermoelectric generators: Materials selection
ALI T-111, Ta-8W-2Hf CCA: TA
ET Hf*Ta*W; Hf sy 3; sy 3; Ta sy 3; W sy 3; Ta-8W-2Hf; Hf; Hf*O; HfO2; Hf cp; cp; O cp

L77 ANSWER 20 OF 20 METADEX COPYRIGHT 2002 CSA
AN 1981(3):34-235 METADEX
TI Structure on Palladium Overlayers on Niobium and Tantalum and the Relationship to Hydrogen Uptake.
AU Strongin, M.; El-Batanouny, M.; Pick, M.A.

SO Phys. Rev. B, Condens. Matter (15 Sept. 1980) 22, (6), 3126-3129
DT Journal
LA English
AB Films of Pd deposited onto Nb and Ta undergo a structural change at a thickness of about one monolayer, where the Pd goes from a commensurate structure on (110) Nb and Ta to (111) f.c.c. Pd for thicker films. When this change occurs there is a dramatic increase in the H-uptake rate into the underlying metal.7 refs.-AA
CC 34 CHEMICAL AND ELECTROCHEMICAL PROPERTIES
CT Hydrogen: Sorption; Niobium: Sorption; Tantalum: Sorption; Palladium: Coatings; Chemisorption: Coating effects
ET Pd; Nb; Ta; H

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L91 ANSWER 1 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Epitaxial growth of GaN film on (La,Sr)(Al,**Ta**)O3 (**111**) substrate by metalorganic chemical vapor **deposition.**

L91 ANSWER 2 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Nanostructure formation and soft magnetic properties evolution in Fe 91 - xWxB9 amorphous alloys.

L91 ANSWER 3 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Retardation of Ta silicidation by bias **sputtering** in Cu/ **Ta**/Si(**111**) thin films.

L91 ANSWER 4 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI X-ray diffuse scattering associated with ferroelectric microregions in KTa1-xNbxO3.

L91 ANSWER 5 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Reduction of the phase transition temperature of TiSi2 on Si(**111**) using a **Ta** interlayer.

L91 ANSWER 6 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Bias **sputtered** Ta modified diffusion barrier in Cu/**Ta** (Vb)/Si(**111**) structures.

L91 ANSWER 7 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Processing of oriented **K**(**Ta**,Nb)O3 films using chemical solution deposition.

L91 ANSWER 8 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Remote plasma-assisted metal organic chemical vapor **deposition** of tantalum nitride thin films with different radicals.

L91 ANSWER 9 OF 33 COMPENDEX COPYRIGHT 2002 EEI

TI On the structural and physical properties of sputtered multilayers of the FeSiB-CuNb alloy system.

L91 ANSWER 10 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Investigation of ion beam mixing effects in Ta/Pd bilayers **deposited** on Si.

L91 ANSWER 11 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Dwell sensitivity fatigue behavior of high temperature materials.

L91 ANSWER 12 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Dwell effects in isothermal and thermo-mechanical fatigue of advanced materials.

L91 ANSWER 13 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Surface segregation and chemisorption of CO and oxygen on Pt25Ni75(111) studied by XPS and HREELS.

L91 ANSWER 14 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Plastic deformation of fine-**grained** structures produced from amorphous alloys at elevated temperatures.

L91 ANSWER 15 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Brillouin light scattering investigation of the elastic properties of Ta/Al metallic superlattices.

L91 ANSWER 16 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr, Ta and SiO2 buffer layers.

L91 ANSWER 17 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Double superconducting transitions in YBa2Cu3Ox versus oxygen content.

L91 ANSWER 18 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Split superconducting transitions in the specific heat and magnetic susceptibility of YBa2Cu3Ox versus oxygen content.

L91 ANSWER 19 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Synthesis and morphology of CVD diamond on Ta and TaC film.

L91 ANSWER 20 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Changes in microstructure and soft magnetic properties of an Fe86Zr7B6Cu1 amorphous alloy upon crystallization.

L91 ANSWER 21 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI Interdiffusion reactions in Ni/Ta multilayers studied by x-ray diffraction.

L91 ANSWER 22 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI MAGNETIZATION OF AN ELECTROLESS **DEPOSITED** NICKEL-PHOSPHORUS ALLOY.

L91 ANSWER 23 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI AES STUDY OF THE REACTION OF OXYGEN WITH T-**111** (**Ta** -8W-2hf).

L91 ANSWER 24 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI ELECTRICAL RESISTIVITY AND STRUCTURE OF THIN NICKEL FILMS - EFFECT OF ANNEALING.

L91 ANSWER 25 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI SIMULTANEOUS AUGER SURFACE SPECTROSCOPY STUDY OF **SPUTTERED** a-Si, a-Si:H AND MONOCRYSTALLINE Si (111) WITH AND WITHOUT H CHEMISORPTION.

L91 ANSWER 26 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI HIGH TEMPERATURE KINETICS OF REFRACTORY METAL GASIFICATION BY ATOMIC **FLUORINE**.

L91 ANSWER 27 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI EFFECT OF ZONE-REFINING ON ORIENTATIONS OF RECRYSTALLIZED GRAINS FORMED IN ROLLED AND ANNEALED **PURE** Mo AND Ta SINGLE CRYSTALS.

L91 ANSWER 28 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI ULTRASONIC DETERMINATION OF THE SUPERCONDUCTING ENERGY GAP IN HIGH-**PURITY** TANTALUM.

L91 ANSWER 29 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI 1 bar 1 bar 2]SINGLE CRYSTALS OF HIGH-**PURITY** TUNGSTEN, MOLYBDENUM AND TANTALUM.
ON THE ROLLING DEFORMATION AND RECRYSTALLIZATION OF (111.

L91 ANSWER 30 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI FORMATION OF A METASTABLE PYROCHLORE-TYPE CRYSTAL IN **K**(**Ta**,Nb)O3-CONTAINING GLASSES AND ITS RELATION TO STRUCTURE OF THE GLASSES.

L91 ANSWER 31 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI X-RAY ANALYSIS OF **SPUTTERED** FILMS OF BETA-TANTALUM AND BODY-CENTERED CUBIC TANTALUM.

L91 ANSWER 32 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI OXIDE PLATELET FORMATION IN BULK TANTALUM.

L91 ANSWER 33 OF 33 COMPENDEX COPYRIGHT 2002 EEI
TI **Sputtering** of Ta single crystals and Ta- Cb alloys.

=> d L91 1,2-8,10,15-16,19,21,23,26-33 all

L91 ANSWER 1 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 2002(43):2154 COMPENDEX
TI Epitaxial growth of GaN film on (La,Sr)(Al,**Ta**)O3 (**111**) substrate by metalorganic chemical vapor **deposition**.
AU Sumiya, Masatomo (Dept. of Elec. and Electronic Eng. Shizuoka University, Hamamatsu 432-8561, Japan); Chikyow, Toyohiro; Sasahara, Takayuki; Yoshimura, Katsuhiko; Ohta, Jitsuo; Fujioka, Hiroshi; Tagaya, Sumiyoshi; Ikeya, Hirofumi; Koinuma, Hideomi; Fuke, Shunro
SO Japanese Journal of Applied Physics, Part 1: Regular Papers and Short Notes and Review Papers v 41 n 8 August 2002 2002.p 5038-5041
CODEN: JAPNDE ISSN: 0021-4922
PY 2002
DT Journal
TC Experimental
LA English
AB GaN films were grown on (La0.29,Sr0.71)(Al0.65,Ta0.35)O 3 (LSAT) (111) substrates, the lattice constant of which matched the 3 * 3 structure of GaN (0001) and the thermal expansion coefficient of which was close to

that of GaN, by atmospheric metalorganic chemical vapor **deposition**. It was found that the surface of LSAT having a perovskite crystal structure was damaged in ambient of NH3 and TMG gas. However, the epitaxial growth of GaN film on the LSAT substrate was achieved by using an AlN blocking layer to prevent the damage by these gases. The crystallographic orientation was evaluated from a phi-scan of 4-cycle X-ray diffraction to be GaN[11 over bar 00] parallel LSAT[1 1 over bar 0] rotating in plane by 30deg against the expected orientation (GaN[21 over bar 1 over bar 0] parallel LSAT[11 over bar 0]). The 30deg rotation would be caused by the bond configuration of the surface of the LSAT substrate. The interface structure at the substrate and the threading dislocation in the films were also investigated using a cross-sectional transmission electron microscope. 17 Refs.

CC 802.2 Chemical Reactions; 712.1.2 Compound Semiconducting Materials; 933.1.1 Crystal Lattice; 802.3 Chemical Operations; 933.1.2 Crystal Growth; 641.1 Thermodynamics

CT *Chemical vapor **deposition**; Interfaces (materials); Transmission electron microscopy; Crystal orientation; Ammonia; Perovskite; Crystallography; Gallium nitride; Crystal structure; Epitaxial growth; Lattice constants; Thermal expansion

ST Epitaxial lateral overgrowth (ELO) technique

ET Ga*N; GaN; Ga cp; cp; N cp; La*Sr; La sy 2; sy 2; Sr sy 2; La0.29,Sr; La cp; Sr cp; Al*Ta; Al sy 2; Ta sy 2; Al0.65,Ta; Al cp; Ta cp; O; H*N; NH; H cp; Al*N; AlN; La; Sr; Al; Ta

L91 ANSWER 2 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 2002(8):359 COMPENDEX

TI Nanostructure formation and soft magnetic properties evolution in Fe 91 - xWxB9 amorphous alloys.

AU Sulitanu, Nicolae (Faculty of Physics Department of Solid State Physics Al.I.Cuza University, Iasi 6600, Romania)

SO Materials Science and Engineering B: Solid-State Materials for Advanced Technology v 90 n 1-2 Mar 7 2002 2002.p 163-170
CODEN: MSBTEK ISSN: 0921-5107

PY 2002

DT Journal

TC Theoretical

LA English

AB The crystallization behavior of the amorphous Fe91 - xWxB9 (0 < x < 14), the microstructure and the soft magnetic properties of the nanocrystalline Fe-W-B alloys have been investigated. It was found that the primary crystallization precipitates consist of mixture of the bcc-Fe and bct-Fe3B phases. The tungsten addition makes **grain** size decrease. The **grain** size of the primary Fe91 - xWxB9 (6 <EQ x <EQ 12) alloys was evaluated to be 18-9 nm. The small **grain** size seems to reflect the small growth rate of the primary precipitates resulting from re-distribution of the W element between the primary bcc-Fe, bct-Fe3B and residual amorphous phases, which is due to their small solubility, large cohesive energy and small diffusivity to alpha-Fe. The best soft magnetic properties have been obtained for the Fe91-xWxB9 (6 <EQ x <EQ 12) optimally annealed (900 < **Ta** < 936 **K**) alloys. These nanostructured alloys show high magnetic flux density of 1.58-1.76 T, high permeability of 21.000-33.000 at 1 kHz and zero magnetostriction, simultaneously. This behavior is thought to result from the exchange magnetic coupling mechanism among the different ferromagnetic phases containing in these optimally annealed alloys. It is concluded that the nanocrystalline Fe-W-B optimally annealed alloys (6-12 at.% W) are suitable materials for core pole transformers. 32 Refs.

CC 531 Metallurgy and Metallography; 933.1 Crystalline Solids; 701.2

Magnetism: Basic Concepts and Phenomena; 933.1.1 Crystal Lattice; 802.3 Chemical Operations; 801.4 Physical Chemistry
CT *Amorphous alloys; Magnetic permeability; Crystal microstructure; Crystallization; **Grain** size and shape; Annealing; Magnetostriction; Magnetic couplings; Nanostructured materials
ST Optimally annealed alloys
ET Fe; B*W; WxB; W cp; cp; B cp; B*Fe*W; B sy 3; sy 3; Fe sy 3; W sy 3; Fe-W-B; B*Fe; Fe3B; Fe cp; W

L91 ANSWER 3 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 2001(39):2989 COMPENDEX
TI Retardation of Ta silicidation by bias **sputtering** in Cu/**Ta**/Si(**111**) thin films.
AU Moshfegh, A.Z. (Department of Physics Sharif University of Technology, Tehran, Iran); Akhavan, O.
SO Journal of Physics D: Applied Physics v 34 n 14 Jul 14 2001 2001.p 2103-2108
CODEN: JPAPBE ISSN: 0022-3727
PY 2001
DT Journal
TC Experimental
LA English
AB In this investigation, we have studied the effect of negative bias voltage on the properties of a **sputtered** Ta layer **deposited** at high Ar pressure (13.3 Pa) which is used as a diffusion barrier in a Cu/Ta/Si structure focusing on its silicidation process. According to Rutherford backscattering spectrometry, the Cu(85 nm)/Ta(100 nm, unbiased)/Si(111) structure was found to be stable up to 300deg C in a N2 environment for 30 min. At a temperature of 450deg C, TaSi 2 was formed at the **Ta**/Si(**111**) interface, and the **Ta** diffusion barrier completely failed. By applying various negative bias voltages ranging from 0 to -150 V, an optimum bias voltage of Vb = -50 V for the **sputtered** Ta layer was found from scanning electron microscopy and four-point-probe resistivity measurements. In addition, the normalized ion flux (ni), defined as the ratio of Ar+ ion flux to Ta flux, was determined to be 7.5 for optimum experimental conditions. As a result, the biased Ta layer was used as a diffusion barrier between Cu and Si; it showed a low resistivity of 99 muomega cm, a density of about 14.1 g cm-3 with a good surface morphology and a contribution of bcc-Ta phase structure of about 65%. The Cu(50 nm)/Ta(50 nm, biased)/Si(111) structure was demonstrated to be thermally stable under perfect conditions up to 500deg C and TaSi2 formation in an N2 environment for 30 min was retarded up to 700deg C. 28 Refs.
CC 543.4 Tantalum and Alloys; 813.1 Coating Techniques; 804.2 Inorganic Components; 931.2 Physical Properties of Gases, Liquids and Solids; 933.1.1 Crystal Lattice; 801.4 Physical Chemistry
CT *Tantalum; Electric conductivity measurement; Morphology; Thermodynamic stability; Density (specific gravity); Interfaces (materials); Scanning electron microscopy; **Sputter deposition**; Thin films; Diffusion in solids; Crystal structure; Rutherford backscattering spectroscopy; Thermal effects
ST Retardation; Silicidation; Bias **sputtering**; Four point probe resistivity measurement
ET Ta; Ar; Cu; N; Si*Ta; Si sy 2; sy 2; Ta sy 2; TaSi; Ta cp; cp; Si cp; Si

L91 ANSWER 4 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 2001(24):844 COMPENDEX
TI X-ray diffuse scattering associated with ferroelectric microregions in KTa1-xNbxO3.
AU Abe, H. (Dept. of Materials Science and Eng. National Defense Academy,

239-8686 Yokosuka, Japan); Harada, K.; Matsuo, R.J.; Uwe, H.; Ohshima, K.
SO Journal of Physics Condensed Matter v 13 n 14 Apr 9 2001 2001.p 3257-3270
CODEN: JCOMEL ISSN: 0953-8984
PY 2001
DT Journal
TC Theoretical
LA English
AB X-ray diffuse scattering for single crystals of KTa1-xNbxO3 (x = 0, 0.007 and 0.011) has been measured. For the sample of x = 0.011, peculiar x-ray diffuse scattering is observed above the phonon-frozen-in temperature (30 K). By an analysis of the diffuse scattering intensities, the average radius of the ferroelectric microregions is found to grow up to around 4 nm with decreasing temperature from 100 K down to 30 K. Anisotropic distributions of the diffuse scattering indicate off-centred shift of Nb and **Ta** ions to the <**111**>-direction. Moreover, lattice constants for x = 0.011 below 30 K exhibit negative expansion, which is found neither in **pure** KTa3 nor in KTa1-xNbxO3 (x = 0.007) at low temperatures. These results are successfully explained by introducing the effective classical potential (ECP) method for the anharmonic oscillators. The quantum contribution to mean square displacement of Nb and Ta ions from an average position is also calculated by the ECP method. 22 Refs.
CC 932.1 High Energy Physics; 933.1 Crystalline Solids; 804.2 Inorganic Components; 931.3 Atomic and Molecular Physics; 708.1 Dielectric Materials; 931.4 Quantum Theory
CT *X ray scattering; Phonons; Ferroelectric materials; Quantum theory; Low temperature effects; Lattice constants; Calculations; Single crystals; Potassium compounds
ST X ray diffuse scattering; Effective classical potential
ET K*Ta; K sy 2; sy 2; Ta sy 2; KTa; K cp; cp; Ta cp; Nb*O; NbxO; Nb cp; O cp; Nb; Ta

L91 ANSWER 5 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 2001(20):1138 COMPENDEX
TI Reduction of the phase transition temperature of TiSi2 on Si(**111**) using a **Ta** interlayer.
AU Jung, Bokhee (Hanyang Univ, Seoul, South Korea); Kim, Young Do; Yang, Woochul; Nemanich, R.J.; Jeon, Hyeongtag
MT Proceedings of the 1999 MRS Spring Meeting - Symposium N: 'Advanced Interconnects and Contacts'.
MO Advanced Micro Devices, Inc.; IBM T.J. Watson Research Center; Novellus Systems, Inc.
ML San Francisco, CA, USA
MD 05 Apr 1999-07 Apr 1999
SO Materials Research Society Symposium - Proceedings v 564 1999. p 59-64, Materials Research Society, Warrendale, PA, USA
CODEN: MRSPDH ISSN: 0272-9172
ISBN: 1-55899-471-8
PY 1999
MN 56193
DT Conference Article
TC Experimental
LA English
AB The effect of a thin Ta interlayer on the C49 to C54 phase transition of TiSi2 on Si(**111**) was examined. The **Ta** interlayered samples were prepared by **depositing** Ta and Ti films sequentially oil Si(111) substrates in a UHV system. As control samples, 100 angstroms Ti films were **deposited** directly on clean Si(111) substrates. The **deposited** substrates were annealed for 10 rain, in-situ, at temperatures between 500 deg C and 750 deg C using 50 deg C increments. The TiSi2, which formed in this UHV process, was analyzed with XRD, AES,

SEM, TEM, and four-point probe measurements. The control samples exhibited the C49 to C54 transition at a temperature of 750 deg C. However, the TiSi2 samples with 5 angstroms and 10 angstroms Ta interlayers displayed a significant reduction of the phase transition temperature. The XRD analysis indicated that the C49 to C54 transition temperature of TiSi2 was lowered by approximately 200 deg C. The sheet resistance measurement showed a low resistivity characteristic of C54. The SEM and TEM micrographs showed that the Ta interlayer also suppressed the surface agglomeration of the C54 TiSi2 film. The AES analysis data indicated that the composition of the titanium silicide showed the expected Ti:Si stoichiometry of 1:2.(Author abstract) 14 Refs.

CC 712.1 Semiconducting Materials; 714.2 Semiconductor Devices and Integrated Circuits; 543.4 Tantalum and Alloys; 804.2 Inorganic Components; 712.1.1 Single Element Semiconducting Materials; 933.1.1 Crystal Lattice

CT *Semiconducting films; Phase transitions; Transmission electron microscopy; Stoichiometry; Auger electron spectroscopy; Scanning electron microscopy; Thin films; Tantalum; Titanium compounds; Semiconducting silicon; Crystal orientation; X ray diffraction analysis

ST Four-point probe measurement

ET Ta; C; Si*Ti; Si sy 2; sy 2; Ti sy 2; TiSi; Ti cp; cp; Si cp; Si; Ti; Ti:Si; Si doping; doped materials

L91 ANSWER 6 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 2000(36):1711 COMPENDEX

TI Bias **sputtered** Ta modified diffusion barrier in Cu/**Ta** (Vb)/Si(**111**) structures.

AU Moshfegh, A.Z. (Sharif Univ of Technology, Tehran, Iran); Akhavan, O.

SO Thin Solid Films v 370 n 1 2000.p 10-17
CODEN: THSFAP ISSN: 0040-6090

PY 2000

DT Journal

TC Experimental

LA English

AB In this investigation, we have fabricated **Ta**(Vb)/Si(**111**) and Cu/**Ta**(Vb)/Si(**111**) systems using a DC bias **sputtering** technique at high Ar pressure (100 mTorr). For **Ta**/Si(**111**) system, **tantalum** layer was formed under various bias voltages ranging from 0 to minus 150 V.The films were characterized by Rutherford backscattering spectrometry (RBS), scanning electron microscopy (SEM) and four-point probe sheet resistance measurements (Rs). From electrical resistivity and SEM data, a minimum resistivity (99 mu Omega cm) and well surface morphology at an optimum bias voltage (Vb equals minus 50 V) was obtained for the **Ta** (Vb)/Si(**111**) system. The **Ta** films **deposited** under these conditions with 50 nm thickness are then used as a diffusion barrier in the Cu/**Ta**(Vb)/Si(**111**) multilayer structure. According to our RBS, SEM and RS analysis, the Ta barrier layer formed under the controlled bias **sputtering** at high Ar pressure has demonstrated an improved Ta structure with excellent thermal stability up to 650 degree C for the Cu/**Ta**(Vb)/Si(**111**) system annealed in N2 environment for 30 min. Formation of TaSi2 was observed at 700 degree C after the barrier failure using RBS spectra.(Author abstract) 34 Refs.

CC 813.2 Coating Materials; 813.1 Coating Techniques; 543.4 Tantalum and Alloys; 931.2 Physical Properties of Gases, Liquids and Solids; 701.1 Electricity: Basic Concepts and Phenomena; 714.2 Semiconductor Devices and Integrated Circuits

CT *Multilayers; Electric conductivity of solids; Diffusion in solids; Electric potential; Thin films; Rutherford backscattering spectroscopy; Scanning electron microscopy; Electric resistance measurement;

Sputtering; Tantalum
ST Diffusion barrier; Multilayer structures; Rutherford backscattering spectrometry; Four point probe sheet resistance measurement
ET Cu; Ar; Ta; V; 50V; is; V is; C; N2; Si*Ta; Si sy 2; sy 2; Ta sy 2; TaSi2; Ta cp; cp; Si cp

L91 ANSWER 7 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1999(40):707 COMPENDEX
TI Processing of oriented **K**(**Ta**,Nb)O3 films using chemical solution deposition.
AU Suzuki, Kazuyuki (Nagoya Univ, Nagoya, Jpn); Sakamoto, Wataru; Yogo, Toshinobu; Hirano, Shin-ichi
SO Journal of the American Ceramic Society v 82 n 6 1999.p 1463-1466
CODEN: JACTAW ISSN: 0002-7820
PY 1999
DT Journal
TC Experimental
LA English
AB **K**(**Ta**,Nb)O3 (KTN) thin films have been prepared by the chemical solution deposition method. KTN precursors consisted of a uniform mixture of **K** left bracket **Ta**(OC2H5)6 right bracket and K left bracket Nb(OC2H5)6 right bracket with interaction at the molecular level. Perovskite KTN thin films with the desired composition (Ta/Nb equals 65/35, 50/50, and 35/65) were synthesized from the precursor solutions by the dip coating method. KTN thin films with (100) preferred orientation were successfully synthesized on MgO(100) and Pt(100)/MgO(100) substrates. X-ray pole figure measurements showed that **grains** of KTN films had a prominent three-dimensional regularity on MgO(100) and Pt(100)/MgO(100) surfaces. The Curie temperatures of KTN films decreased with increasing Ta/Nb ratio. Typical P-E hysteresis loops were observed for KTN thin films of three compositions on Pt(100)/MgO(100) substrates. The values of remanent polarization (Pr) of KTN films increased as the Ta/Nb ratio changed from 65/35 to 35/65.(Author abstract) 22 Refs.
CC 813.1 Coating Techniques; 802.2 Chemical Reactions; 804.2 Inorganic Components; 801.4 Physical Chemistry; 801.1 Chemistry (General); 701.2 Magnetism: Basic Concepts and Phenomena
CT *Film preparation; Electromagnetic wave polarization; Molecular dynamics; Synthesis (chemical); Coating techniques; Molecular orientation; Hysteresis; Composition; Chemical vapor deposition; Potassium compounds
ST Chemical solution deposition; Dip coating method; Remanent polarization
ET K*Ta; K sy 2; sy 2; Ta sy 2; K(Ta; K cp; cp; Ta cp; Nb; K; C*H*O*Ta; Ta(OC2H5)6; O cp; C cp; H cp; C*H*Nb*O; Nb(OC2H5)6; Nb cp; Ta; Mg*O; MgO; Mg cp; Pt; P

L91 ANSWER 8 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1999(17):2983 COMPENDEX
TI Remote plasma-assisted metal organic chemical vapor **deposition** of tantalum nitride thin films with different radicals.
AU Cho, Kwang-Nam (Hanyang Univ, Ansan, South Korea); Han, Chang-Hee; Noh, Kyung-Bong; Oh, Jae-Eung; Paek, Su-Hyoun; Paek, Chang-Soo; Lee, Sang-In; Lee, Moon Yong; Lee, Jong Gil
SO Japanese Journal of Applied Physics, Part 1: Regular Papers & Short Notes & Review Papers v 37 n 12A Dec 1998.p 6502-6505
CODEN: JAPNDE
PY 1998
DT Journal
TC Experimental
LA English
AB Thin films of tantalum nitride have been **deposited** from remote plasma-assisted metal organic chemical vapor **deposition**

(RP-MOCVD) using the reaction of pentakis-dimethyl-amino-tantalum (PDMATa) with different activated radicals.Microstructures of **deposited** films measured by X-ray diffraction (XRD) and transmission electron microscopy (TEM) depend on the **deposition** temperature and the type of radicals.At temperatures below 300 degree C, amorphous films are obtained which are independent of the reacting species.On the other hand, at higher **deposition** temperatures, (111)-preferred cubic TaN films are obtained when they react with ammonia plasma, while the reaction with hydrogen plasma produces amorphous films. All amorphous films obtained are recrystallized at an annealing temperature of 1000 degree C in an oxygen-containing (10%) ambient, showing (**111**) TaN, bcc **Ta**, and signals of orthorhombic Ta2O5. From detailed studies of film composition and chemical bonding in the obtained films, the impurity incorporation, especially carbon, is responsible for the dependence of film microstructures on different **deposition** conditions.(Author abstract) 12 Refs.

CC 933.2 Amorphous Solids; 804.2 Inorganic Components; 802.2 Chemical Reactions; 932.3 Plasma Physics; 641.1 Thermodynamics; 804 Chemical Products Generally

CT *Amorphous films; Crystal microstructure; Metallorganic chemical vapor **deposition**; Plasma enhanced chemical vapor **deposition**; Thermodynamic stability; Free radicals; Thermal effects; Crystallization; Thin films; Tantalum compounds

ST Body-centered cubic (BCC) structure; Pentakisdimethylaminotantalum; Tantalum nitride

ET C; N*Ta; TaN; Ta cp; cp; N cp; Ta; O*Ta; Ta2O5; O cp

L91 ANSWER 10 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 1998(37):3418 COMPENDEX

TI Investigation of ion beam mixing effects in Ta/Pd bilayers **deposited** on Si.

AU Bibic, N. (Inst of Nuclear Sciences, Belgrade, Yugosl); Milosavljevic, M.; Perusko, D.; Jeynes, C.

MT Proceedings of the 1996 10th International Conference on Thin Films, ICTF-10.

ML Salamanca, Spain

MD 23 Sep 1996-27 Sep 1996

SO Thin Solid Films v 317 n 1-2 Apr 1 1998.p 274-277
CODEN: THSFAP ISSN: 0040-6090

PY 1998

MN 48670

DT Journal

TC Experimental

LA English

AB This paper presents a study of the effects of As plus ion irradiation and vacuum thermal treatments on Ta/Pd bilayers on silicon. The layers were **deposited** by DC **sputtering** to the thickness of 60 nm (Pd) and 45 nm (**Ta**) on (**111**)Si wafers. The **Ta** /Pd/Si structures were then implanted with 300, 400 and 500 keV As plus ions at room temperature (RT), to the doses from 0.5-1 center dot 1016 ions cm minus 2. Thermal treatments of samples were performed in vacuum at 900 degree C, for 10 min. Characterizations were performed by Rutherford backscattering spectroscopy and X-ray diffraction. It was found that intermixing of the components at Ta/Pd and Pd/Si interfaces depends on the value of damage energy FD **deposited** by the incident ions at the interfaces. Ion bombardment at room temperature induces the formation of Pd2Si phase with polycrystalline structure. Post-implantation annealing at 900 degree C made possible the growth of PdSi silicide. Then, the reaction of Ta with Si is enhanced by rapid silicon diffusion through already formed PdSi phase. Consequently, the formation of TaSi2 and Ta3Si

silicides at the Ta/PdSi interface occurred.(Author abstract) 14 Refs.
CC 543.4 Tantalum and Alloys; 547.1 Precious Metals; 932.1 High Energy Physics; 714.2 Semiconductor Devices and Integrated Circuits; 537.1 Heat Treatment Processes; 633.1 Vacuum Applications
CT *Multilayers; Rutherford backscattering spectroscopy; Ion bombardment; **Sputter deposition**; Silicon wafers; Heat treatment; Vacuum applications; Ion implantation; Tantalum; Palladium
ST Bilayers; Ion beam mixing; Silicides
ET Ta; Pd; Si; C; Pd*Si; Pd sy 2; sy 2; Si sy 2; Pd2Si; Pd cp; cp; Si cp; PdSi; Si*Ta; Ta sy 2; TaSi2; Ta cp; Ta3Si

L91 ANSWER 15 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1995(37):4430 COMPENDEX
TI Brillouin light scattering investigation of the elastic properties of Ta/Al metallic superlattices.
AU Carlotti, G. (Universita di Perugia, Perugia, Italy); Fioretto, D.; Socino, G.; Xia, Hua; Hu, An; Jiang, S.S.
MT Proceedings of the 1994 Fall Meeting of MRS.
ML Boston, MA, USA
MD 28 Nov 1994-02 Dec 1994
SO Thin Films: Stresses and Mechanical Properties V Materials Research Society Symposium Proceedings v 356 1995.Materials Research Society, Pittsburgh, PA, USA.p 385-390
CODEN: MRSPDH ISSN: 0272-9172
PY 1995
MN 42888
DT Conference Article
TC Experimental
LA English
AB The Brillouin light scattering technique has been exploited for investigating the elastic properties of periodic superlattices made by alternating layers of Ta and Al. These multilayers, **deposited** by d.c.**sputtering** on glass and Si substrates, present a polycrystalline structure with (110) and (**111**) texture for the **Ta** and Al layers, respectively. They have total thicknesses of about 0.5 mu m and periods ranging from 4 to 10 nm.Measurement of the phase velocities of the Rayleigh and Sezawa acoustic modes from the frequency position of the corresponding Brillouin peaks, yielded information on the effective elastic constants of the superlattices. For large periods (8-10 nm) the values determined experimentally are in good agreement with those calculated from the elastic constants of the bulk materials, while for lower periods (4-6 nm) the estimated elastic constants exhibit a marked increase. This anomalous behavior has been attributed to the presence of a transition layer at each interface, where Ta and Al interdiffuse, as observed by x-ray and electron microscopy experiments.(Author abstract) 24 Refs.
CC 933.1 Crystalline Solids; 741.1 Light. Optics; 421 Strength of Building Materials. Mechanical Properties; 543.4 Tantalum and Alloys; 541.1 Aluminum; 712.1.1 Single Element Semiconducting Materials
CT *Metallic superlattices; X ray diffraction analysis; Tantalum; Aluminum; **Sputtering**; Semiconducting silicon; Crystal structure; Interfaces (materials); Brillouin scattering; Elasticity
ST Polycrystalline structure; Thickness; Phase velocity measurement; Acoustic modes; Elastic constants; Transition layer
ET Ta; Al; Si

L91 ANSWER 16 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1995(4):8360 COMPENDEX
TI Texture and **grain** size of permalloy thin films **sputtered** on silicon with Cr, Ta and SiO2 buffer layers.

AU Galtier, P. (Thomson-CSF, Orsay, Fr); Jerome, R.; Valet, T.
MT Proceedings of the 1994 MRS Spring Meeting.
ML San Francisco, CA, USA
MD 04 Apr 1994-08 Apr 1994
SO Polycrystalline Thin Films: Structure, Texture, Properties and Applications Materials Research Society Symposium Proceedings v 343 1994.Materials Research Society, Pittsburgh, PA, USA.p 417-422
CODEN: MRSPDH ISSN: 0272-9172
PY 1994
MN 21394
DT Conference Article
TC Experimental
LA English
AB We have investigated the structural properties of Ni80Fe20 thin films **sputtered** on silicon with Cr, Ta and SiO2 buffer layers using transmission electron microscopy.We obsérve a decrease of the **grain** size whenTa and SiO2 underlayers are used instead of Cr.Permalloy films **deposited** on **Ta** layers are strongly (**111**) textured while those grown on Cr and SiO2 are mostly randomly oriented.The results are discussed with respect to the nanostructure of both Ta, Cr and SiO2 underlayers and in relation to the variation of the magnetic softness observed in this system. (Author abstract) 15 Refs.
CC 531 Metallurgy and Metallography; 548.2 Nickel Alloys; 933.1.2 Crystal Growth; 933.1.1 Crystal Lattice; 549.3 Others (including Bismuth, Boron, Cadmium, Cobalt, Mercury, Niobium, Selenium, Silicon, Tellurium and Zirconium); 543.1 Chromium and Alloys
CT *Metallic films; Silica; Thin films; Textures; **Grain** size and shape; Silicon; Chromium; Tantalum; Nickel alloys; **Sputter deposition**
ST Nickel iron thin films; Buffer layers; Permalloy; Nanostructure; Magnetic softness
ET Fe*Ni; Fe sy 2; sy 2; Ni sy 2; Ni80Fe20; Ni cp; cp; Fe cp; Cr; Ta; O*Si; SiO2; Si cp; O cp

L91 ANSWER 19 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1993(26):86502 COMPENDEX
TI Synthesis and morphology of CVD diamond on Ta and TaC film.
AU Togashi, Fumitaka (Science Univ of Tokyo, Tokyo, Jpn); Kobayashi, Ken; Mitsuhashi, Masahiko; Karasawa, Shiro; Ohya, Seishiro; Watanabe, Takeshi
MT Proceedings of the 10th International Conference on Crystal Growth - ICCG-10.
MO Airtron/Synoptics; AKZO; Allied Signal Corp; Bertram Lab; Ceres Corp; et al
ML San Diego, CA, USA
MD 16 Aug 1992
SO Journal of Crystal Growth v 128 n 1-4 pt 1 Mar 1 1993.p 418-424
CODEN: JCRGAE ISSN: 0022-0248
PY 1993
MN 18430
DT Journal
TC Application; Experimental
LA English
AB Synthetic diamond films have been **deposited** on the Si(**111**) surface, polycrystalline **Ta** plate, TaC/Si, and TaC/Ta substrates using an electron assisted chemical vapor **deposition** (EACVD) method.The effects of substrate pretreatment and existence of carbide layer on the diamond nucleation, subsequent growth and morphology have been studied.The substrate pretreatment, scratching by diamond powder, affects nucleation behavior, subsequent

growth and morphology of diamond.Existence of carbide layer and formation of carbide on the substrate affects nucleation density, growth rate and morphology of diamond.(Author abstract) 11 Refs.

CC 933.1.2 Crystal Growth; 804.2 Inorganic Components; 482.2 Minerals; 802.3 Chemical Operations; 933.1.1 Crystal Lattice; 549.3 Others (including Bismuth, Boron, Cadmium, Cobalt, Mercury, Niobium, Selenium, Silicon, Tellurium and Zirconium)

CT *Crystal growth; Carbides; Crystal structure; Morphology; Substrates; Tantalum carbide; Tantalum; Synthetic diamonds; Film growth; Chemical vapor **deposition**

ST Electron assisted chemical vapor **deposition**; Substrate pretreatment; Diamond nucleation; Carbide layers; Growth rates; Scratching

ET Si; Ta; C*Ta; TaC; Ta cp; cp; C cp

L91 ANSWER 21 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 1991(12):151988 COMPENDEX DN 9112151927

TI Interdiffusion reactions in Ni/Ta multilayers studied by x-ray diffraction.

AU Hollanders, Mark A. (Delft Univ of Technology, Delft, Neth); Duterloo, Caroline G.; Thijsse, Barend J.; Mittemeijer, Eric J.

SO J Mater Res v 6 n 9 Sep 1991 p 1862-1873
CODEN: JMREEE ISSN: 0884-2914

PY 1991

DT Journal

TC Experimental; Theoretical

LA English

AB Diffusion-induced phase transformations were studied in Ni/ beta -Ta multilayers between 523 K and 823 K, primarily using X-ray diffraction.The multilayers had a modulation length, Lambda , of 20.3 nm and a composition of Ni48Ta52.They were polycrystalline without coherency between the Ni and Ta sublayers. Upon annealing at relatively low temperatures (up to 723 **K**) **Ta** dissolved in crystalline Ni, concurrently with the formation of an amorphous phase.The interdiffusion reactions did not take place only at the Ni/Ta interfaces, but also along the **grain** boundaries in the sublayers.The chemical diffusion coefficient in the amorphous phase was determined at 673 K, using a previously developed method.The results were compared with experiments on Ni/Ti multilayers, which show similar reactions.At 723 K and higher temperatures the fcc (Ni, Ta) solid solution transformed into the stable Ni3Ta compound.(Author abstract) 32 Refs.

CC 531 Metallurgy & Metallography; 802 Chemical Apparatus & Plants; 537 Heat Treatment; 933 Solid State Physics; 641 Heat & Thermodynamics; 921 Applied Mathematics

CT *GLASS, METALLIC:Synthesis; SOLID SOLUTIONS:Phase Transitions; COMPOSITE MATERIALS:Heat Treatment; CHEMICAL REACTIONS:Reaction Kinetics; DIFFUSION:Thermodynamics; THERMODYNAMICS:Mathematical Models

ST NICKEL/TANTALUM MULTILAYER STRUCTURES; DIFFUSION-INDUCED PHASE TRANSFORMATIONS; SOLID-STATE INTERDIFFUSION REACTIONS; AMORPHOUS PHASE FORMATION; INTERMETALLIC PHASE FORMATION

ET Ni; Ta; Ni*Ta; Ni sy 2; sy 2; Ta sy 2; Ni48Ta52; Ni cp; cp; Ta cp; Ni3Ta

L91 ANSWER 23 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 1983(6):72469 COMPENDEX DN 830648973; *8397964

TI AES STUDY OF THE REACTION OF OXYGEN WITH T-**111** (**Ta** -8W-2hf).

AU David, D.J. (Univ of Dayton, Research Inst & Materials Engineering Dep, Dayton, Ohio, USA); Snide, J.A.; Moddeman, W.E.

SO Appl Surf Sci v 13 n 3-4 Sep-Oct 1982 p 329-351
CODEN: ASUSDD ISSN: 0378-5963

PY 1982

LA English
AB Reactions of oxygen with T-111, the kinetics of the reaction, the role of hafnium, and the rate-controlling step of such reactions at elevated temperatures were evaluated using polished and etched specimens whose surfaces were monitored from optical and secondary electron images.Auger electron spectroscopy (AES), and Auger mapping were essential in obtaining a comprehensive assessment and understanding of the surface reactions and kinetics.Oxygen was found to preferentially associate with hafnium.The concentrations of HfO2 decreased and that of Hf increased at elevated temperatures, indicating thermally activated transport of HfO2 into the bulk accompanied by Hf enrichment.The percent increase in surface enrichment, the activation energy, and the surface tension of **pure** hafnium were determined.A general theory regarding surface protection at elevated temperatures is proposed.25 refs.
CC 543 Chromium, Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys; 549 Nonferrous Metals & Alloys; 539 Metals Corrosion & Protection; 801 Chemical Analysis & Physical Chemistry; 802 Chemical Apparatus & Plants; 615 Thermoelectric & Other Power Generators
CT *TANTALUM TUNGSTEN HAFNIUM ALLOYS:Oxidation; SURFACES:Spectroscopic Analysis; CHEMICAL REACTIONS:Reaction Kinetics; THERMOELECTRIC ENERGY CONVERSION
ET Hf*O; HfO2; Hf cp; cp; O cp; Hf; Ta*W; Ta sy 2; sy 2; W sy 2; Ta-8W

L91 ANSWER 26 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1978(7):5332 COMPENDEX DN 780752944
TI HIGH TEMPERATURE KINETICS OF REFRACTORY METAL GASIFICATION BY ATOMIC **FLUORINE**.
AU Nordine, Paul C. (Yale Univ, New Haven, Conn)
SO J Electrochem Soc v 125 n 3 Mar 1978 p 498-508
CODEN: JESOAN
PY 1978
LA English
AB Intrinsic kinetics for the F/Ir, Pt, Ta reactions were measured using microwave discharge, low pressure, transonic flow reactor techniques with filament gasification rates deduced from specimen resistance vs. time measurements. Data are obtained in the temperature ranges 1000-1450 deg K for Ir, 600-1430 deg K for Pt, and 1100-3030 deg **K** for **Ta**, at F-atom partial presures between 0. 65-7.4 Pa. Also, transient filament resistance and temperature changes could be observed which lead to the conclusion that condensed **fluoride** films occur on the metals on exposure to atomic **fluorine**. These films do not inhibit the gasification reaction. 40 refs.
CC 543 Chromium, Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys; 547 Precious & Rare Earth Metals & Alloys; 549 Nonferrous Metals & Alloys
CT *REFRACTORY METALS
ET Pt; Ta; Ir; F

L91 ANSWER 27 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1977(6):4445 COMPENDEX DN 770641802
TI EFFECT OF ZONE-REFINING ON ORIENTATIONS OF RECRYSTALLIZED GRAINS FORMED IN ROLLED AND ANNEALED **PURE** Mo AND Ta SINGLE CRYSTALS.
AU Ohba, Y. (Natl Res Inst for Metals, Tokyo, Jpn); Fujii, T.
SO J Less Common Met v 52 n 1 Mar 1977 p 93-99
CODEN: JCOMAH
PY 1977
LA English
AB The effects of the number of zone passes on the orientations of recrystallized grains are studied in rolled and annealed Mo and **Ta** crystals with a (**111**) 1-bar 1-bar 2]orientation. The

recrystallized texture of Mo which has been zone-refined only once is mainly composed of (511) 1-bar 05]and (310) 001]components, whereas that of Mo which has been zone-refined three times is composed of a sharp single (110) 001]component. In Ta which has been zone-refined once,the recrystallized texture is composed of (110) 001]and (1-bar 1-bar 5) 5-bar 5-bar 2-bar]components, the latter having a twin relationship with the rolled matrix. In Ta which has been zone-refined three times, the (110) 001]component is still predominant but the (110) 001]component decreases and the (1-bar 1-bar 5) 5-bar 5-bar 2-bar]component increases with increasing number of zone passes. Most of the recrystallized grains are in good coincidence with the rolled matrix. 16 refs.

CC 531 Metallurgy & Metallography; 543 Chromium, Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys

CT *MOLYBDENUM METALLOGRAPHY:Recrystallization; TANTALUM METALLOGRAPHY:Recrystallization

ET Mo; Ta

L91 ANSWER 28 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 1977(1):2324 COMPENDEX DN 77016473

TI ULTRASONIC DETERMINATION OF THE SUPERCONDUCTING ENERGY GAP IN HIGH-**PURITY** TANTALUM.

AU Reed, Robert W. (Pa State Univ, University Park); Boyer, Allen C.

SO J Low Temp Phys v 24 n 1-2 Jul 1976 p 35-40
CODEN: JLTPAC

PY 1976

LA English

AB Ultrasonic attenuation measurements as a function of temperature were made for sound propagating along the 100], 110], and **111**]crystal directions of **Ta** single-crystal specimens. Sound frequencies from 180 to 500 MHz were used with single crystals having residual resistance ratios up to 3866. For the three propagation directions used, the superconducting energy gap had an average value of 1.77 kTc, which was within the experimental error for the three separate values of the gap parameter. 12 refs.

CC 543 Chromium, Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys; 708 Electric & Magnetic Materials; 753 Sound Technology & Ultrasonics

CT *SUPERCONDUCTING MATERIALS; TANTALUM AND ALLOYS; ULTRASONIC WAVES:Attenuation

ET Ta

L91 ANSWER 29 OF 33 COMPENDEX COPYRIGHT 2002 EEI

AN 1975(4):3460 COMPENDEX DN 750426369

TI 1 bar 1 bar 2]SINGLE CRYSTALS OF HIGH-**PURITY** TUNGSTEN, MOLYBDENUM AND TANTALUM.
ON THE ROLLING DEFORMATION AND RECRYSTALLIZATION OF (111.

AU Fuji, T. (Natl Res Inst for Met, Tokyo, Jpn); Ohba, Y.; Tamura, Y.

SO J Less-Common Met v 39 n 1 Jan 1975 p 161-172
CODEN: JCOMAH

PY 1975

LA English

AB The rolling deformation and recrystallization behavior of W, Mo and **Ta** single crystals with (**111**) 1 bar 1 bar 2]orientation have been studied. All specimens with this orientation were shown to be stable on rolling in the cases of w, Mo and Ta; the sharpness of the rolled textures of Ta was lost to some extent on increasing the rolling temperature, although only slightly in the case of Mo. The recrystallization was observed to take place with greater difficulty in the edge regions of the transverse side of the specimens, where abnormal deformation would be expected to occur during rolling, than it did in the

central region. The recrystallized textures of Mo rolled up to 60% reduction consisted of almost only one component, that of (110) 001], while for Ta there were two components, (110), 001]and (115) 5 bar 5 bar 2]. The recrystallized textures obtained by artificial recrystallization were not in accord with those carried out by spontaneous recrystallization. 43 refs.
CC 543 Chromium, Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys; 549 Nonferrous Metals & Alloys; 547 Precious & Rare Earth Metals & Alloys; 531 Metallurgy & Metallography
CT *REFRACTORY METALS:Deformation; TUNGSTEN METALLOGRAPHY; MOLYBDENUM METALLOGRAPHY; TANTALUM METALLOGRAPHY
ET W; Mo; Ta

L91 ANSWER 30 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1974(1):2053 COMPENDEX DN 74011991
TI FORMATION OF A METASTABLE PYROCHLORE-TYPE CRYSTAL IN **K(Ta,**Nb)O3-CONTAINING GLASSES AND ITS RELATION TO STRUCTURE OF THE GLASSES.
AU Ito, Setsuro (Kyoto Univ, Jap); Kokubo, Tadashi; Tashiro, Megumi
SO J Cer Soc Jap v 81 n 8 1973 p 327-333
CODEN: YGKSA4
PY 1973
LA Japanese
AB A metastable crystal is found to precipitate in K2O-Ta2O5-Nb2O5 glasses with addition of small amounts of Al2O3 and SiO2 on heating prior to precipitation of a perovskite-type **K(Ta,**Nb)O3 crystal. X-ray **fluorescence** analyses show that the major components of the metastable crystal are K2O, Ta2O5 and Nb2O5. Powder x-ray diffraction analyses reveal that this metastable crystal is a pyrochlore-type and its cell dimension is 10.62 A. From the relative intensities of x-ray diffraction lines, the composition of the crystal is calculated to be K1.5(Ta0.65, Nb0.35)2O5.75. Results are discussed. 14 refs. In Japanese with English abstract.
CC 812 Ceramics & Refractories
CT *GLASS:Crystallization; CRYSTALS; POTASSIUM COMPOUNDS
ET K*Ta; K sy 2; sy 2; Ta sy 2; K(Ta; K cp; cp; Ta cp; Nb; K*Nb*O*Ta; K sy 4; sy 4; Nb sy 4; O sy 4; Ta sy 4; K2O; O cp; Ta2O5; Nb2O5; Nb cp; K2O-Ta2O5-Nb2O5; Al*O; Al2O3; Al cp; O*Si; SiO2; Si cp; K*O; O*Ta; Nb*O; K1.5(Ta0.65; Nb0.35

L91 ANSWER 31 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1973(6):3185 COMPENDEX DN 730631980
TI X-RAY ANALYSIS OF **SPUTTERED** FILMS OF BETA-TANTALUM AND BODY-CENTERED CUBIC TANTALUM.
AU Read, Mildred H. (Bell Telephone Lab, Murray Hill, NJ); Hensler, D.H.
SO Thin Solid Films v 10 n 1 Apr 1972 p 123-135
CODEN: THSFAP
PY 1972
LA English
AB The X-ray diffraction patterns obtained from thin films ofbeta-Ta and b.c.c.-Ta are complicated by variations in type and degree of preferred orientation, and by variations in cell parameters. A discussion of the effects of these variations on the modified Debye-Scherrer X-ray diffraction patterns is given. The diffraction patterns from the commonly observed (200)beta-**Ta** and (110) and (**111**) b.c.c.-**Ta** preferred orientations are illustrated, as well as those from mixtures of the two phases. the difficulty in determining the orientation and relative amount of a phase present in a film containing both phases on the basis of diffractometer traces alone is emphasized. 12 refs.
CC 421 Materials Properties; 539 Metals Corrosion & Protection; 543 Chromium,

Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys
CT *TANTALUM AND ALLOYS:**Sputtering**; FILMS:Metallic; FILMS:X-Ray Analysis; X-RAY ANALYSIS
ET Ta

L91 ANSWER 32 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1972(12):2000 COMPENDEX DN 721212553
TI OXIDE PLATELET FORMATION IN BULK TANTALUM.
AU Kampe, D.J. (Univ of Va, Charlottesville); Lawless, K.R.
SO Scanning Electron Microscopy, Proc of 4th Annu Symp, Chicago, Ill, Apr 27-29 1971, and Workshop on Forensic Applications, Apr 30 1971 IITRI, 1971, p 201-208
PY 1971
LA English
AB Scanning electron microscopy in conjunction with transmission electron microscopy and optical microscopy is used to study the initial stages of the oxidation of high **purity**(**111**)and(110)**Ta** single crystals and large-grained 5 mil thick sheet of approximately(001)orientation. The oxidations, performed at 530 deg C and 5x10-4 torr oxygen pressure, proceed by the formation and growth of microscopic platelets. 16 refs.
CC 422 Materials Testing; 543 Chromium, Manganese, Molybdenum, Tantalum, Tungsten, Vanadium & Alloys; 715 General Electronic Equipment
CT *TANTALUM AND ALLOYS:Oxidation; MICROSCOPES, ELECTRON; CRYSTALS:Microscopic Examination
ST OXIDE PLATELETS; SCANNING ELECTRON MICROSCOPY
ET Ta

L91 ANSWER 33 OF 33 COMPENDEX COPYRIGHT 2002 EEI
AN 1970(3):419 COMPENDEX DN 700311637
TI **Sputtering** of Ta single crystals and Ta- Cb alloys.
AU DUBINSKII VE; LEBEDEV SYA; RODIONOVA VG
SO Fizika Tverdogo Tela v 11 n 9 Sept 1969 p 2526-9
PY 1969
LA English
AB Argon ions of 70 kev energy were used perpendicular to (**111**) plane of **Ta** and Ta- 25 at% Cb crystals; **sputtered** material was **deposited** on cooled semi- cylindrical glass collector, which was studied by means of special arrangement for microphotometry; **sputtering** at 95 and 290 K are similar and correspond to W and Mo **sputtering** patterns; curve of **deposited** optical density vs incidence angle shows directions with increased density. 8 refs. In Russian. 11637
CC 121; 127; 155
CT *TANTALUM AND ALLOYS:**Sputtering**; METALS AND ALLOYS: **Sputtering**; PHYSICS:Solid State
ET Ta; W; Mo